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Science-Fiction

MAY 1944

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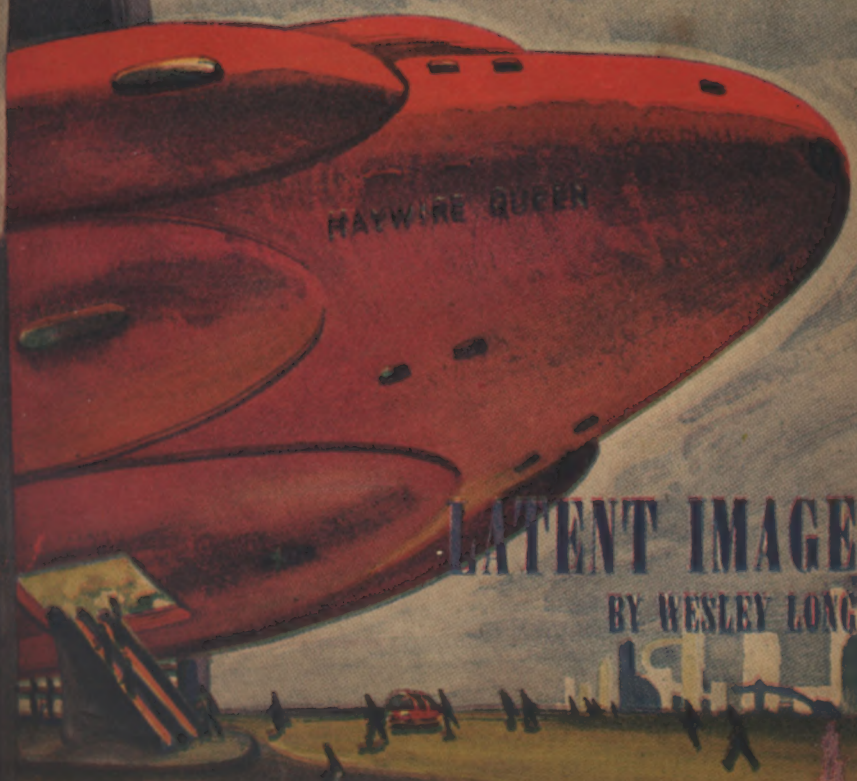

LATENT IMAGE

BY WESLEY LONG

ASTOUNDING SCIENCE-FICTION

MAY 1944

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Illustrations by Alfred, Orban and Williams

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JOHN W. CAMPBELL, JR.

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NEXT ISSUE ON SALE MAY 16, 1944

Sandwich for Nazis

Since man became a tool-using animal, the strength of his tools, rather than his own strength, has become of primary importance. Yet it was only in the last century that real engineering investigation of material strengths was undertaken; only in this century that a major attack on the problem of making things stronger was really gotten under way. There had been efforts, naturally. The first production and tempering of steel is lost in the mists of antiquity.

In recent years some most remarkable new paths to strength of materials have been found. Aluminum alloys, magnesium alloys, super-steels and the like have attracted a lot of attention. They hold less promise of new and greater advances than do some rather overlooked items. They are, after all, simple developments along the old line of advance—improved metallic alloys. The different angle of attack on the problem of strength of materials centers about compound materials and sandwich materials.

It's been known for many years that glass fibers of extremely small cross section show very high strengths. The finer the individual fiber, the greater the strength shown on a per square inch basis. Someone did some extrapolation on that item, incidentally, and came up with the amazing determination that a glass fiber of zero cross section would have a tensile strength of 1,000,000 pounds per square inch—four or five times that of the best steel wire. Perfect mathematical proof that nothing is better than anything.

Actual glass fibers of very small diameter do show strengths of 250,000 to 300,000 pounds per square inch, though. And glass is about as dense as aluminum alloys. Furthermore, those fibers that have the tensile strength of the finest steel piano wire are just about as tough and flexible, but, unlike steel, they will not corrode in salt water, air, acids or in any of the more common chemical agents. Here is a material light as or lighter than aluminum with strength surpassing the best steel—immensely better than ordinary steels. Further, it is made from the commonest elements of the Earth's crust—silicon, oxygen, calcium and sodium. Glass fibers are decidedly not fragile; they'll take a tremendous beating, and return elastically to precisely the original shape and dimensions. They won't burn, they'll stand high temperatures, they're excellent electrical insulators, don't contaminate materials they come in contact with, and can be woven into fabric. Glass fabrics are becoming important insulation materials; they will shortly become increasingly important as tough, long-wearing, fireproof fabrics for general use.

More important, the glass fibers, loosely matted and impregnated with a tough plastic binder produce

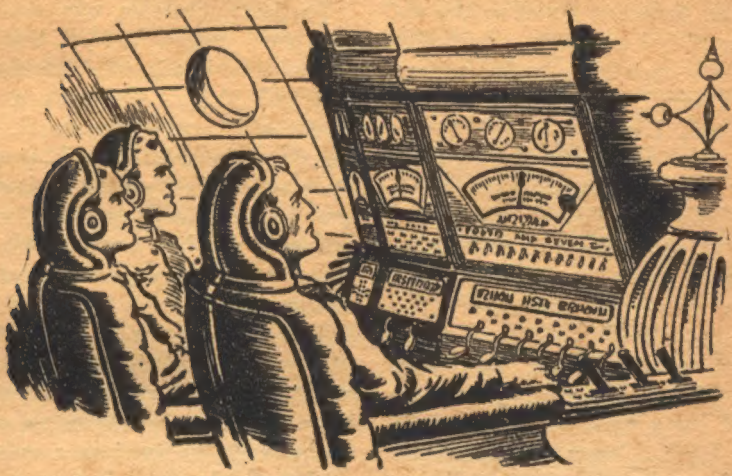
a "plastic" material that displays the terrific strength of glass fibers, with extremely light weight. What the glass fibers lack individually in stiffness is in large measure supplied by the mutual support they can render each other when the plastic binder is added. This compound material—glass and synthetic resin—is only one of a great group of such mixed-material possibilities. Essentially wood itself is, of course, just such a mixed-substance material, where cellulose fibers are bound together by a natural resin, lignin. But Man has not done much work with interdependent strength-materials; the possibilities offer a complete line of research, a line that may well replace many of the present materials with far lighter, stronger, compound materials.

In essence, the standwich materials represent the compound material reduced to its simplest elements. A layer of material A, a layer of B and a layer of A—or C. Common plywood is the #1 representative of the class. The next most familiar example is shatterproof glass. In plywood, the "layer of A" is wood, and B becomes the binding adhesive. In shatterproof glass, it's glass and a synthetic resin. But the sandwich really begins to come into its own with the type of sandwich represented in the famous Mosquito fighter-bomber. The sandwich is wood, with a glue binding the layers together; the trick is that the wooden sandwich is made up of a layer of very thin, fragile hardwood veneer, a comparatively thick slab of balsa—on the order of a quarter of an inch in thickness—and another thin, fragile peeling of hardwood veneer. The veneer will break and split if handled roughly. It has no useful strength—you can stick a finger through it, its so flimsy. The balsa—? Well, if you've never worked with balsa, you can't appreciate what spongy, soft, almost pithy wood it is. It cuts like cheese—but even more easily, because it doesn't stick to the knife. You can make dents in a balsa plank by squeezing it between your fingers.

Out of this the tough, viciously deadly Mosquito is made and that balsa-and-veneer sandwich is the load-bearing, stress-absorbing material! How? True, you can dent balsa with your fingers—but the dent is shallow, and it takes a good strong grip. And despite its spongy softness, it doesn't split as easily as some harder woods. Its tensile strength is low—but it is featherlight, and, in comparatively thick cross section, has good compression strength. And while veneer splits at the slightest strain across the grain, its tensile strength along the grain is really high. The balsa, locked between the two veneers, won't let them belly and wave; the veneers can absorb heavy stresses, because, their grains laid at right angles, they reinforce each other and the balsa. The stiffness they so woefully lack, the featherlight, thick layer of balsa supplies. The sandwich is tough, strong, rigid, and extremely light—as perfect for the job as the Nazi-killing Mosquito is in its job.

THE EDITOR.

McBride vanted to get home in a hurry. There was a spaceship available, but an experimental model that wouldn't work, it didn't have a pilot, and the only pilot around didn't have a license!



"Latent Image"

by WESLEY LONG

Illustrated by Orban

John McBride stood on the roof garden of Satan's Hotel, looking across the River Styx at Sharon. To his left, the River Styx emptied into the Sulphur Sea, and in the evening sky to his right, the dancing flames lighted the cloud banks over Mephisto, where the uranium smelters worked on a nonstop plan.

John McBride was in Hell.

But Hell is a city on Pluto, where the planners had a free hand because no intelligent life had ever scarred the planet until man came with his machinery and his luxury and his seeking for metal. Uranium had been found in plenty on Pluto, and so man had created a livable planet from the coldest, most forbidding planet in the System.

John McBride was in Hell, on Pluto, but his mind was dwelling

in a little cube that rotated about a mythical spot halfway between Sol and Pluto; one of the many stations that created the space warp that focused Sol on Pluto with an angle of incidence equal to the incidence of Sol on Terra. Enid McBride was back there in that minute station, and John McBride wanted to be with her.

But Dr. Caldwell, the resident doctor of the Plutonian Lens, said: "John, if you've got to go to Pluto, that's O. K. But you can't take Enid with you. That's strictly out, with a capital 'O,' get me?"

"I suppose—"

"I've been doctoring for many years, John. It's safe for you to run off for a week or so, but don't move Enid. Your kid won't be born for a month, yet, but if you subject her to the 4- or 5-G you need to get from here to Pluto, you'll have—not only the baby, but as nasty a mess as you've ever seen! Take it from me, fella, 4-G is worse than a fall if you keep it up for hours. No dice!"

"O. K.," said John, unhappily. "She'll be all right?"

"Sure," said Caldwell. "Besides, all you can do now is to sit around, bite your fingernails, and ask foolish questions. If I had my way, you'd be away when the youngster is born, that'd save you from a lot of useless worry."

"That isn't fair."

"I know you feel that way. Enid does too. But it is still sort of futile. You want the right to worry; go ahead and worry. After all, there are enough people around the Lens that know you are worrying. She'll be all right, I tell you!"

"You'll let me know if anything turns up?"

"That's a promise, John."

So John McBride was standing on a roof garden in Hell, thinking how appropriate it was. He was in Hell, all right. Hell was a nice place to be, warm, pleasant, and happily balanced. But it was no place to be when your wife is nineteen hundred million miles away. Ah, well, another week of this and he would be racing homeward.

Home! That was funny, to consider home, a place in space where gravity was furnished by an mechanogravitic warp, and where there were no windows to open, and where you lived in a cube of steel three thousand feet on a side, mostly filled with the items required for living plus the maze of equipment required to maintain the great lens that gave Pluto its sun.

Home! It was a far cry from his boyhood home on Venus, where the greenery of the forest fought with the very walls. But home is where you like it, and McBride liked it.

He wished that he were there, for he felt that Enid needed him.

Then with that perversity of nature that people call fate, a bellhop approached him and handed him a spacegram. McBride tipped the boy and opened the envelope easily. He'd been getting 'grams by round numbers for several years, and this was no novelty. He was not aware of its importance until he opened the folded page and read:

JOHN MC BRIDE
SATAN'S HOTEL
HELL, PLUTO
HIT SKY FOR HOME. ENID IN NO GREAT DANGER FROM FALL, BUT HER RECOVERY WILL BE ASSISTED BY YOUR PRESENCE.
CALDWELL.

McBride read the words twice, and then looked around himself, wildly. *Hit Sky* was easy to say—but at 6-G it would take just over one hundred hours to make the passage. Four days minimum!

McBride raced to the elevator, chewed his fingernails while the car rode him down the hundred and seven floors with that snail's pace caused by many stops. He shot out of the elevator door, caromed off the opposite wall into an ash tray which he upset and sent a small cascade of sand across the floor. McBride coasted to a stop before the hotel manager's desk and tossed the 'gram in front of him. The manager read and looked up in sympathy.

McBride said: "Get me a reservation on the next sunward-bound ship. Emergency stop; they'll make the stopoff with an emergency."

"Right." The manager spoke into the phone and then said: "And you'll be checking out?"

"Yes. Have one of the boys collect my stuff and ship it out to Station 1."

"O. K., McBride, we'll see that your stuff is taken care of. Ben!" he called out through the door, "hurry up on that reservation, and see that a car is ready to take Mr. McBride to Hellsport."

"T'won't be necessary," said Ben with a glum face. "The *Uranium Lady* just took off fifteen minutes ago, and there isn't another ship scheduled out of Hellsport for five days."

"Five days!" groaned McBride. "Anything flyable on this planet?"

"Nothing that would take a run to the Lens," said Ben.

"Sure?"

"Almost positive. However, I'll put a request on the radio that may smoke out an unknown."

"I'll buy the thing if they won't let me go any other way," said McBride.

"We understand," said the hotel manager.

McBride stamped up and down the hotel lobby for an hour. His luggage came down, all collected and prepared. He called Caldwell, and spoke to him for an hour, but Dr. Caldwell's protestations didn't help McBride. Enid had fallen from a chair while cleaning out a shelf, and was resting easily, no complications. Yes, there was some pain, enough to make Enid want her husband near. No danger, no, but it would be best if he were there.

But McBride was still one hundred hours and nineteen hundred million miles away.

John McBride didn't see the messenger boy bringing the message until he almost bumped into him. "Mr. McBride, here's your answer," said the lad, and he saw McBride rip the envelope open with

a quick gesture to read the following:

MC BRIDE:
EXPERIMENTAL SPACESHIP *HAYWIRE QUEEN* AT YOUR COMMAND IF YOU CAN REPAIR ALPHATRON. MEET ME AT HELLSPORT.
STEVE HAMMOND (SKYWAYS)

McBride said to the messenger: "It's grabbing at straws, but get me a cab and I'll take a whirl at it."

"Think you can do it?" asked the lad.

"Don't know. I'm desperate. After all, it's a wild chance because if Steve Hammond and his gang haven't been able to repair it, how can I expect to?"

"Give it a whirl anyway, sir," said the lad.

"That I'll do," said McBride. "And now that cab!"

The *Haywire Queen* stood above McBride as he met Steve Hammond. "What's your trouble, John?" asked Hammond.

McBride explained. Then he asked: "What's yours?"

Hammond smiled wryly. "That's a long, sad tale. We've been trying to increase the efficiency of the drive, you know. We've been hunting up and down the electrogravitic spectrum for a more efficient operating point. We found what we knew already; that we were using the most efficient part of the E-grav range. We went all the way from down low, where the stuff is just beginning to make itself detectable to up high where the equipment is slightly fragile and extremely experimental in construction. Then we took a run at the mec-grav, with absolutely no success other than to ruin a whole bank of relays; the mechanogravitic warp extended farther than we anticipated when we hit the mechanogravitic resonance of the drive bar, and hell sort of flew all over in great hunks. One of the interesting items was the closing of the E-grav field controls, and the resulting power drain overloaded the alphatron. We limped in using a jury-rigged line from the lifeship's alphatron and made a something-slightly-less than a crash landing here on Pluto.

"So now we're either stuck here until we get the new alphatron we ordered, or you can give us a few hints on household repairs."

"What's your lifeship's output?" asked McBride, following Hammond into the spacelock.

"About eleven hundred alphons."

"You'll need about fourteen hundred to take off from Pluto," said John. "How's the big one?"

"Deader than the proverbial dodo, whatever that was."

"Dodo?" laughed McBride. "That was a mythical critter that went around dead, I think. It was so dead, even when alive, that when it really died, it was really dead."

"You'd better stick to alphatrons," laughed Hammond.

"Speaking of the equipment, have you tried to get a replacement on Pluto?"

"Nothing didding. About our only chance is to haywire something together. But remember, we still

have to make a landing, somewhere, and that means a safety factor is somewhat to be desired."

"Not at all. If we can take off safely, we're in!"

"Explain. As I was taught in school, anyone can fly a spaceship, but it takes a pilot to land one."

"Sure, but remember you'll be stopping off at the Lens. We've got replacements there that will enable you to make space repairs and go on from there in safety."

"Didn't think of that. Well, here's the mess!"

McBride needed no close inspection to see that the alphatron was definitely defunct. A foul smell, faint, ephemerally pungent, permeated the room. It was the smell of burned synthetic coil dope and field-winding varnish which has been described as smelling something like a frying toupee.

"Not only dead," was his cryptic remark, "but dead and sutteed!"

"Fricasseed," corrected Hammond. "Anything we can do?"

"Is the winding intact?"

"We thought of that, too. Nope. Electrical inspection indicates that the winding is melted together in several places. You couldn't unwind the coil, let alone rewind it with fresh insulation. We've got a couple of gallons of insulation handy, if you get a good idea."

"Not yet. But look, Hammond, have you tried the magnetogravitic spectrum yet?"

"No. That was our next program."

"I'd have tried that first," mused McBride. "Knowing that the drive depends upon the action of a cupralum bar under high magnetic density plus an electrogravitic warp, I should think that the close relationship between the magnetic and electronic phenomena would lead you to try the mag-grav first."

"I didn't want to start at the top," said Hammond dryly. "In spite of the fact that Dr. Ellson claimed to have discovered a region in the mag-grav spectrum that produced a faint success."

"Well, what I'm thinking is that we can rip up the E-grav generator and use the field coil for the alphatron. It'll carry electrons as well as it carries alphons, you know."

"Better," said Hammond. "But what do we use for an E-grav?"

"First we'll hunt up through the spectrum of the magnetogravitic spectrum. If that doesn't work, we can add the warp produced by your mech-grav, run from the lifeship's little alphatron. Right?"

"It's an idea. Seems to me that I've heard somewhere that the combined warps of magneto- and mechanogravitic produces some vectors in the electrogravitic spectrum."

"Mind if I brag?" asked McBride. "That was in a paper I scribbled for the Interplanetary Gravitic Engineers. Purely a matter of making a few dimes, at the time there was nothing practical about it, since we had E-grav generators before we discovered the mechano- and magnetogravitics."

"We?" grinned Hammond. "You were still three generations in the

future at the time, grandpa. But it's worth a try."

"Never thought that my effort was going to be worth a hoot," smiled John McBride. "Let's give it a whirl."

"O. K. I'll call the gang." Steve Hammond stepped to the communicator and spoke. "Jimmy, Pete, Larry! Come a-running and bring your cutting pliers!"

From what was obviously three different parts of the ship, three voices answered.

Pete arrived first. "Meet John McBride of the Plutonian Lens," introduced Hammond. "This is Pete, whose whole name is Peter Thurman, and who is the guy who knows all about drive equipment."

Pete grinned. "You see us hitting sky at two hundred feet per," he said, shaking McBride's hand.

Jimmy arrived, with Larry not far behind. "These are James Wilson and Lawrence Timkins, respectively. Jimmy is the alphatron expert, and Larry knows all there is to know about electrical circuits and wiring."

"He's ribbing me about those relays," laughed Larry, while Jimmy was saying: "Y'smell that smell? That was my pride and joy."

"Tell me," asked McBride, "what does *he* do?"

"Who, Steve? Oh he's just the bird that wanted the things done that resulted in this mess. He's primarily responsible."

"Hm-m-m. That puts the fix on the whole thing," said McBride. "Well, fellow, you've heard about Enid. I've got to get home. If we can fake up something so that the *Haywire Queen* will cut loose with a couple of hundred feet per for long enough to get me to Station 1, I'll see that your ruined equipment is replaced so that you can make a safe landing. Say! How come you do not carry a spare alphatron?"

"Why doesn't man come with two hearts?" asked Jimmy. "That's because they're usually dependable. No one ever tried to run two brains off of one heart—that's why one heart stands up pretty well. I can imagine the trouble that would result if two involuntary control centers were running the same heart—it would be something like what happened when the mech-grav made the E-grav cut in—something would blow a fuse."

They laughed, and then Hammond explained about the program. "Right away quick we'll try the mech-grav along with the mag-grav. That sounds like our best bet for something that works. Also breach the lifeship and sabotage the little alphatron for the mech-grav. Might as well have it down here where it's needed." In an aside to McBride, he added: "Is this like your place? No fuses, no safety devices, no spare equipment because some screwball is always filching something off of a bit of standard equipment to make an experimental set-up?"

"Anything but the running and operating gear of the Lens stations," said McBride, "is subject to change without notice. I've even

seen a spare mech-grav generator used to counterbalance Jim Lear's teeter-totter. Jim's dad is on Station 3 and there isn't any kid of that size and age on Three. Did a good job, too, since Bob Lear fixed the mech-grav density control with a switch that urged the far end of the plank so that Jim was lifted and dropped at the right speed."

"Sort of expensive counterbalance, wasn't it?"

"I suppose so, but Bob said it was better than having to crank his son up and down by hand. Besides, we have lots of power out at the Lens." McBride paused. "Say. Do you run the *Haywire Queen* with this crew? Who's pilot?"

"Hannigan. But he got hurt when the works blew up. He ran us in all right, though any of us can take a trick at landing. But he's taking a rest cure to soothe his nerves; they got a scrambling from too much electricity."

"Too bad."

"No so bad. Just made him jittery. He'll be all right in a week. But we won't have to run home without a pilot. I've got one coming out in a couple of hours. Drake. Ever heard of a pilot named Drake?"

"Seems to me that the name is familiar," said McBride slowly. "But not too clear. I'll know him when I see him."

"I won't. Conducted the hiring by mail, and then gave him a call when the need came—your need, I mean. They told me that Drake was out of the building, but that he'd be at Hellsport as soon as they could find him. Has a pretty good record, too, save for one thing—"

"Steve," said one of the men, "can you give us a lift? The *Beetle's* alphatron is somewhat heavier than we can handle around this corner."

"Sure. And the next time we're at Terra, have 'em fix the hoist rail, huh?"

Wires, bunched cables, and scraps were a tangled mess on the floor. Tools were strewn about in profusion. A box of nuts and bolts had overturned and cascaded the small parts across the floor below the workbench. But the work was progressing in fine shape in spite of the seeming confusion and messiness. To someone who knew these men, it was obvious that they knew their business and how to use their tools even though the place was ankle deep in junk. To someone who knew them not, the place looked like a junk shop.

"Is this the place where the finest brains in space work out the intricate problems?" asked a cool contralto with a cynical tone.

McBride, who had just finished welding a small angle bracket on the bottom of the mech-grav generator, looked up, blinked, did a double take, and then stood up. The torch burned the air in his limp fingers, wasting the canned gas.

"You! Drake! *Sandra* Drake!"

"Is there another?" asked the saucy voice.

"I thought that Sandy was a nickname," snapped Hammond.

"It's Sandra," said she, "and it

looks to me that your friend McBride is always up to his ears in junk!"

John extinguished the torch and advanced upon the picturesque redhead. "Have you still got your license?" he asked. "After that stunt you pulled—"

"Your political pals took away my private license, but I'm still registered as a pilot. This, I've been told, is an emergency, and, therefore, I am compelled to run your junk-heap for you. I'm willing for no other reason than the fact that my assistance to you in your so-called time of need will be instrumental in getting my private license back. Are you ready to go—and where?"

"We're about ready to try," said Steve.

"Try?" scorned Sandra. The perfect features twisted in a sneer. "Aren't the best brains working today?"

"Look, Pilot Drake, this is an experimental crate from way back," snapped Hammond. "You're likely to find yourself drinking coffee out of a relay-shield. We blew out the only alphatron this side of Jupiter by mishap, and John and we have been trying to gain the same effect by trusting to an experiment made several years ago but abandoned."

"I think I'll have none of it," snorted Drake. "I'd like to see a little more of the solar system before I die. You can get some other fool to run your patched-up ash can."

"Drake," said Steve Hammond, "if you do not run this crate for us—or at least try as hard as we are trying—I'll personally see that you are mentioned whenever skunks, lizards, and butyl mercaptan are talked about. This is an emergency."

"Mind telling me just what type of life-and-death run you're going for?" asked Sandra, loftily.

"Enid McBride is hurt and needs him," said Hammond, pointing at John. "There's a small matter involved—a small matter of a baby's life, possibly. If John can get there in time, his presence will give Enid the amount of lift she needs. Get me?"

"Baby?" sneered Sandra. "What woman in her right might would have—"

"Your mother," snapped Hammond, "and she made a mistake. Now will you rectify her error and do something of value for once in your ill-used twenty-four years?"

"I've no choice," said Drake. "I'll do it. But—"

"No buts. You're under suspension right now, and how you handle the *Haywire Queen* marks your card. Take it—or take it!"

"Where's the pilot room?" asked Sandra in a cool tone.

"Below—where it usually is in a ship of this type. Your orders will be coming soon enough, I hope."

"And our destination will probably be Station 1?"

"Right. Will you need navigational details?"

"I can work them out."

Drake left, and the men put the finishing touches on the double-warp set-up. Hammond turned the

equipment on, running them at test power while Jimmy and McBride adjusted the generators for maximum output.

Pete inspected the myriad of little glowing lights on the informer panel and said that the ship was working properly from dome to foot.

"Grab a rolling chair," said Hammond to McBride. Then he snapped the communicator and said: "Drake. Up at twenty feet per."

"Up at twenty feet per second per second acceleration," responded Sandra in that flat, personless voice.

"We hope," said Steve with a short laugh.

An alarm gong sounded through the open communicator, and directly afterward, the men in the power room could hear the relays closing. In the room above them, an oil switch closed with a crashing sound, its racket hardly muffled by the steel-grating floor. A rheostat whirred as it followed the impulses sent from the control board in the pilot's room; it whisked over a dozen contacts and came to rest. Four big pilot lights winked into brilliance above the informer panel, indicating that the ship was, 1.: Airtight; 2.: Properly air-conditioned; 3.: Possessed of sufficient power for flight; and 4.: Ready to lift. Behind a two-foot dial, a diffused light glowed, illuminating the face which would indicate the acceleration in feet per second. A small dynamotor whined up the scale and into the region of inaudibility, and a series of safe lights went on; lights that would be on all the time regardless of what happened to the rest of the operating equipment. The meters of the alphatron moved slightly, and then leaped toward the top peg, stopping before they hit as the meter-sensitivity was cut accordingly. The mag-grav generator meters followed suit, and then the mech-grav meters went through the same dance. Then, far above them in the larger part of the ship, a remotely controlled tap on a bank of high-powered resistors made two steps forward, and an oil switch that connected the drive's electronic requirements to the closed-system turbine went home. Energy charged the gravitic equipment with operating power—

And the *Haywire Queen* lifted upward!

The accelerometer moved quickly up the scale toward twenty.

"We made it!" yelled Jimmy Wilson.

"We're in!" shouted Pete Thurman.

"Thank God!" breathed McBride. "I'm going to call the Lens and tell Doc Caldwell that I'm on the way— Hammond, what is that woman doing?"

The accelerometer had passed twenty, and was approaching twenty-five.

"Probably bunged the accelerometers out of sync when we crash-landed," said Hammond. "They're the standard Hooke Accelerometers, you know, and we may have

stretched the spring a bit. She'll stop soon."

"It's all right," said McBride. "It just makes us get there sooner, but she shouldn't be playing with the drive this close to Pluto. If we've missed something, we'll smack."

The meter passed thirty and headed for forty feet per second per second.

"Little over one Terran G," mentioned Pete. "She probably has the usual Pilot's Fever."

"I know," agreed Hammond, "but her inherent desire to grab sky shouldn't make her play foolish with a brand-new drive."

The meter touched fifty for an instant and then went on up toward sixty. It did not stop at the green line that indicated two Terran G, but passed it and proceeded on toward seventy feet per. It climbed to eighty, passed, approached ninety, passed, and still climbed with a precise linearity that made the men admire the steady hand on the main power lever in spite of whose hand it was.

At one hundred feet per second per second, Hammond said: "When is that dame going to stop?"

"Call her down," suggested Larry.

"Better wait. No use making her nervous this close to Pluto. Bawl her out and she's likely to make the wrong move—and one move would be too much!"

The pressure of 4-G held them to their padded seats, and their heads were fixed immobile in the head braces, all watching the dial climb. It passed one-thirty, went on up the dial to one-forty, and then the voice of Sandra Drake said, weakly:

"When are you fools going to stop?"

Hammond gaped. "Who? Us?"

"Who else?" snapped Drake.

The meter touched one-fifty.

"We're not doing anything. Level off, Drake, or you'll squash us flat!"

"*You* level off. I haven't had the power lever since I adjusted it before I hit the main switch. I can't even lift my arm now; I didn't expect you to run this heap of junk from up there and so I didn't adjust the arm rest."

The dial crept up past one-sixty.

"But we're not running it from here," yelled McBride. "We haven't touched a thing since Hammond told you to take it up at twenty feet per."

The automatic respirators started to work, pumping their rib-cages in rhythm with their own breathing urges, and they sank into the enveloping folds of the elastomer cushions which supported their bodies. The meter hit one-seventy and passed it.

"Then who *is* running the soup up?" came back the labored voice of Sandra Drake. "If this is just a joke, cut it. I can't take much more."

"You—and all of us are doing well to take what we're getting now," stormed McBride. "Who—"

"Something's amiss somewhere," said Hammond thoughtfully. "At this point, any gagster would quit. Look at the meter. One hundred

and ninety feet per! Almost 7-G! Uh—"

Black waves and dizziness came, shrouding little dazzles of colored pinpoints that danced before the eyes. The meter touched two hundred feet per second per second acceleration, and then the drive was cut with a snap. The compressed elastomer rebounded, almost throwing the men from their chairs, but the cover bars held them in.

The drive was completely off; acceleration zero.

"Drake! Get the inertia switch in again!" called Hammond.

"Going in," came the weakened voice of the pilot.

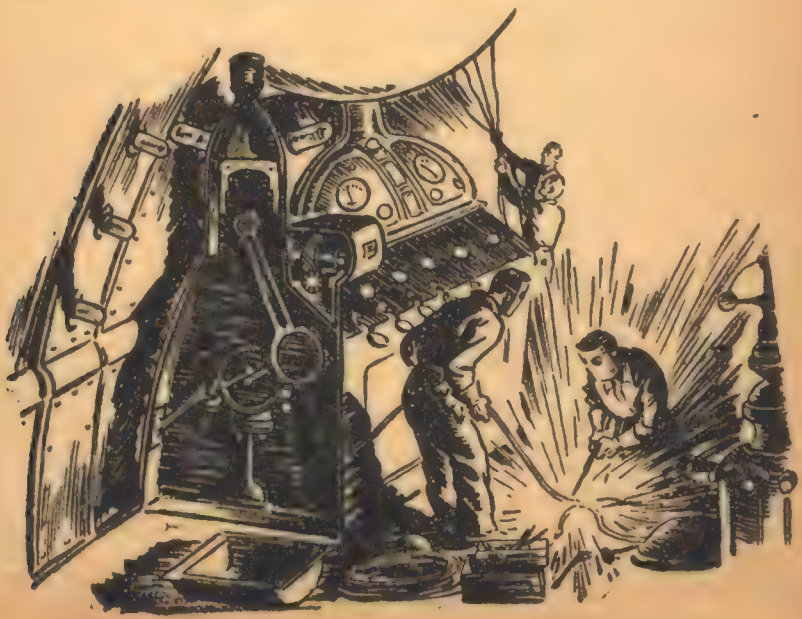
The original twenty feet per started again, and it began to climb, just as it did before. "Stay alive," said Hammond to Drake. "We need you to shove the inertia switch in if nothing else."

"I don't care to die," came her hard voice. "I'll keep alive. You pack of fools figure out what's wrong with your invention, that's all I ask."

"Can you crank the inertia switch down to about 5-G?" asked Pete. "Make it a hundred and fifty feet per. Then sit there and shove it in every time it comes out until we can get out of Pluto's grip. We've got to have a stable place before we can do any fixing."

"You and your jackrabbit drive," jeered Sandra Drake. "Concocted by the best brains in space. Baloney—the best space in brains, I call 'em."

"Some day," promised McBride,



"I'm going to spank that woman—with a hairbrush!"

The meter rode up steadily to one-fifty, and then dropped to zero with a click. The oil switch closed again, and the meter started up the scale once again. This time McBride timed it.

"Steve," he said. "We're running at twenty per, original setting, and the acceleration is increasing at the rate of twenty feet per, also. That means our velocity is increasing at the rate of twenty feet per second per second per second."

"Something screwy. Larry, grab a few tools and ride below and fix that inertia switch so that it will close automatically. No use making Drake sit there punching on that control button every seven and one half seconds. We're going to be running this way for a couple of hours before we get to safe space."

"A couple of hours?" groaned Drake. "Listen, geniuses, is there any reason why I couldn't flatten this chair out? This is killing me."

"Look, Larry, make that switch cut out at 2-G. Sandra, set your drive for 1-G. It'll jerk our guts to pieces, but we'll be doing about the same as any ship under a 1-G drive—no, we'll be doing better. Something in this heap is making us accelerate our acceleration; we're working on the second derivitive. That means—"

"That means," put in McBride, "that we're running on the rate of change of acceleration, which is the rate of change of velocity. Now under this drive, we have a new factor, which we can call 'R' and which stands for the rate of change of acceleration. Then, since our acceleration is increasing with respect to time, the linear equation: $V=AT$ no longer holds to express our velocity at the end of T seconds. Our first equation under this rule becomes one to find the acceleration after T seconds under R rate of change of acceleration. Follow? We have Equation One:

(1) $A=RT$

Then to find the true velocity at the end of T seconds and so forth, we take the integral of that, and we have:

(2) $V=\frac{1}{2}RT^2$

To get the distance covered in T seconds at R rate of change, we integrate once more and come up with . . . ah, let's see— Oh, sure:

(3) $D=\frac{1}{6}RT^3$

Is that clear?"

"I'd like to see that one worked out on a blackboard," said Jimmy. "At the present, I'll take your word for it. What I'm interested in right now is: does this factor 'R' increase with the power setting?"

"Drake just lifted it to thirty feet per," said Hammond, "and I've been timing it. So far, it does."

"Steve," said McBride, "if we can figure out some way of keeping ourselves from getting killed as the acceleration hits the upper brackets, we'll have a drive that will get us places like fury. Think fast, brother."

Hammond looked up, just as the acceleration reached a peak, and it snapped his head sharply.

"Whew," he said. "This is fine stuff, but we couldn't run anywhere very long this way. We'd shake the whole crate loose." He was thoughtful for a minute. "Don't suppose that blackboard mind of yours could figure out our course constants from this saw-toothed curve we're running?"

"Sure," grinned McBride. "Since the thing is not increasing constantly, but is returning to zero accel each time and then building up linearly to peak, our over-all, long-time acceleration is equivalent to the average acceleration. Besides, what difference does it make? We'll get there somehow, and we can probably plot well enough to keep from doing a lot of return-chasing to hit the lens."

"O. K., but we're going to have to figure a way out of this. I couldn't stand knowing anything like this drive without trying to make it practical."

"Wait until we can talk without getting our tongues bitten off by this drive of yours, and we'll go to work on it."

McBride said: "And I'd say let's do it quick! Enid needs me—"

Sandra Drake forced the jack-rabbitting ship into a cockeyed orbit about Pluto after a couple of hours. They had nosebleed, jittery nerves, aching muscles, and voracious appetites by the time the drive was cut. They ate, smoked, took showers, and then decided to call a conference.

Hammond opened it by saying: "There's one quick way to do this. It's on everybody's tongue, but I have the floor and I'll voice it first. To keep from getting squashed by our own weight under a few thousand feet per, we need something to take up the shock—something to counterbalance the gravity-apparent. Jimmy, how many mechano-gravitic generators have we aboard?"

"Two, including the one we're running in the drive right now. It is as big, however."

"How's the output of our patched-together alphatron?"

"Plenty. The coil of the E-grav was much oversize, and since electrons will rush in where alphons fear to tread, we've plenty of soup."

"Then we'll set the other mech-grav up in the nose, and extend the warp down to envelop the ship. Right?"

"Right. And now for some kind of safety factor? Supposing something goes blooey?" asked Pete. "And how do we maintain the relationship between the drive's power and the counter-drive's attraction?"

"Weight-driven power controls for the counter-drive. Inertia switches for safety. Interlocking circuits for every factor so that either the drive failure will knock out the counter-drive, or vice versa. We'll build this like an electric lock, so that the whole shebang must be right on the button before she'll move. Then the failure of any part to perform will stop all parts simultaneously. It'll probably be jerky at first, but the prime function is to get Mac to Station 1, and from there on in we can tinker

with this thing until hell freezes over. O. K., let's hustle the mech-grav into the nose."

Installing the mech-grav generator in the nose of the ship was not a difficult job, since it weighed exactly nothing with the ship in an orbit about Pluto. But the intricate job of hooking the equipment together was to be more difficult.

They rammed holes in the bulkheads to pass cables. They tore out whole sections of unimportant wiring circuits to get wire for the interlocking circuits—and when the terminals were there, the relays and inertia switches had to be made or converted from existing equipment.

Sandra Drake was of little help. She could make the ship perform to within a thousandth of an inch of its design, and perhaps add a few items that the designers hadn't included, but her knowledge of the works was small. She hadn't thought it necessary or desirable to understand, beyond the rudiments, how the drive worked.

In fact, up to the present time she had scorned the knowledge of any higher intricacies; her idea had always been that men were paid to think these things out and she was in a position to pay them for their knowledge. Let them do it, and give them hell if it was not right. Her hiring them automatically gave her the right to order them around like slaves, and since the laws that govern space travel are such that a ship's pilot or owner may demand attention to the ship, Sandra demanded such attention, needed or not.

But this was the second time in less than a year that she had seen men working with equipment. Before, it had been her fault, and she had sniffed at their labors in a scornful attitude, gaining their hatred as she had gained the dislike of so many others.

This time it was slightly different. She had been sandbagged into this job and now it seemed as though her own life depended upon the clearness of the minds of the men who worked over the equipment.

So she entered this strange world of nuts and bolts and small tools strewn around in profusion, and stood amazed at the order that was being worked out of chaos. It was apparent to her that some semblance to order must be present, since they knew where to turn to pick up the right tool, and because the right part was always less than a foot from their ready hands.

A headstrong, spoiled brat she may have been, but Sandra Drake was by no means unintelligent. After John McBride had cut off a tiny lathe-turning just in time to hand it to Pete, who seemed to need it at exactly that moment to fit into his instrument, Sandra said to McBride: "Is there any pattern to all this mess?"

"If there weren't, we'd really be in a mess." He opened the chuck, advanced the rod a few inches, and started to turn the rod down to size again.

"This," said Sandra in that infuriating voice, "is order, neatness,

and efficiency?"

"We like it," answered McBride, his eyes on the cross-feed vernier. "It may not look like a drawing room, but we know what we're doing."

"Do you? Is this a sample of how the place looks every time the *Haywire Queen* goes out to experiment?"

"Undoubtedly."

"Why couldn't it be neat and clean?"

"Because we can't replace every tool back in the cabinet when we are ready to lay it down for a minute. Because it is far better to run cutting chips all over the floor and sweep 'em up once instead of running the broom every seven seconds after each chip. Because it is easier to work this way."

"Well," said Sandra, unimpressed, "the *Haywire Queen* seems deserving of her name."

"There have been a lot of ticklish space problems fought out in her," replied McBride. "Just as we're fighting one now."

"But where are your drawings? Where are your plans? Where are your calculations?"

"Our drawings will be made by draftsmen when we make the thing work," answered McBride. "No sense in having a sheaf of drawings when we'll change the thing a dozen times before it is perfected. Our plans are step-by-step, and any result from one step may change our next step. Our calculations and mathematical deductions will be handled by brilliant mathematicians who can twist simple formulas around to fit the observed data by adding or subtracting abstract terms that fit the case."

"Sounds slightly slipshod to me."

McBride cut the part from the bar and handed it to Pete. "Enough?" he asked, and Pete nodded over his shoulder.

"You can start on part two," he called.

McBride replaced the bar with a larger one and started to work it into shape. "We don't need drawings," he said. "I know what Pete wants and how they should fit together and they're fairly simple parts. He knows what he wants and knows that I know also, so why should we make a lot of sketches for something trivial?"

"It seems to me that this is far from trivial," said Sandra pettishly. "You're playing with the lives of us all."

"Your life wasn't worth a peanut when you tried to run through the lens," said McBride. "Why quibble now?"

"I lived through it," said Drake.

"You'll live through this, perhaps," said McBride. "Besides, we're not too worried about our own lives. We're all willing to take a chance on them for Enid."

"Yeah?" drawled Sandra sourly. "How about the rest of them? That's only speaking for yourself."

Steve Hammond called from across the room: "What he said still goes. He'd do as much for me!"

"Just a big bunch of mutual admirers," sneered Sandra. "Always sticking together in a pinch."

"What's wrong with that?"

"Why didn't you think of your wife a long time ago instead of worrying now. Fine show of nerves for the public consumption!"

"Miss Drake, as far as we are concerned, you haven't been properly treated. Somewhere in the Good Book is a reference to sparing the rod and spoiling the child. Do your parents twist their faces in anguish every time they see you? They should. Anyone who has foisted upon this solar system a stinking little, unfeeling rotter like yourself should hate to be alone with their thoughts. Now get out of here and let us alone."

Sandra moved back at the harshness of his voice. McBride looked behind her and instinctively put out a hand to stop her; but Sandra thought that the move meant violence and moved back faster. She collided with a dangling wire from the alphatron and went rigid. She toppled, as stiff as a board.

"Great Space!" exploded Hammond. "Jimmy, how much was that?"

"Nine hundred alphons," answered Jimmy, looking at the meters on the alphatron and making a quick calculation. "Not enough to harm. She's just had all of her voluntary nervous system paralyzed."

McBride stooped, picked her up, and carried her to a work-chair, which he kicked horizontal with his foot and dropped her into it. He went to the medicine cabinet and filled a hypo which he shot into her arm. Gradually her too-regular breathing became humanly irregular again and she moved to get up.

"Stay there," said McBride.

"Rest a bit," advised Hammond.

"And remember next time," warned Jimmy, "that this kind of a place is no place to walk backwards. Another two hundred alphons—and that is far from impossible—and you'd have been extremely dead." He wiped his forehead with a dirty cloth, mopping the beads of nervous perspiration away.

"I suppose that would have left you without a pilot," said Sandra. Her sharp remark lacked her usual conviction, however, and she realized that it fell flat. She got out of the chair and left abruptly.

"Well, I'll be—"

"Be careful," said Larry. "She isn't worth it."

"I'm going to take the bad taste out of my mouth by calling the Lens," announced McBride.

"Go ahead," offered Pete. "We'll polish off here and by the time you're through, we'll make a stab at it!"

McBride got a through connection to Station 1, and Dr. Caldwell came to the phone.

"Doc," asked McBride. "How's Enid?"

"Touch and go, lad. We're still fighting."

"Bad?"

"I'm afraid to say 'no' to that one," answered Caldwell in a tight voice.

"What does she say?"

"She's been in a coma ever since

the fall, except for a minute or two in which she called for you. John, I shouldn't have sent you away."

"Don't worry about that one. After all, you didn't know she was going to take a header."

"Yeah, but—"

"You fix her up and we'll forget it."

"But suppose—"

"Doc, is it that bad?"

"I can not deny that she would be infinitely better off if you were here. She needs an emotional lift."

"I'm trying."

"I know, lad, but the next ship off of Pluto is in five days and then four more days of flight at a killing drive. Nine interminable days."

McBride debated the advisability of telling Caldwell of their experiment, but decided against it. If he said anything about the possibility of getting there sooner, Caldwell might tell Enid on the chance that it might do her some good. On the other hand, if Enid thought he were coming, and he did not come, the shock—

"O. K., Doc. We'll get there somehow."

"We'll keep fighting," said Caldwell.

He hung up the phone as Hammond spoke into the communicator. "Sunward at thirty feet per," he said.

"Thirty feet per," answered Drake. "And may we not get burned!"

"Trusting soul," observed Hammond.

Sandra thrust the main lever home with a savage motion. Deftly she juggled the steering levers until the ship pointed at Sol. "We're off," she said. "Hold your hats!"

The accelerometer climbed by the second. It hit one hundred feet per, and then slowed in its climb, approaching one twenty in an exponential curve. In the other room, a step-by-step switch continued to click off the contacts, and the generators in the turbine room whined higher and higher up the scale. Minutes passed and became a half hour.

"We're in," said McBride, with a deep exhalation. "But how in the name of sin can we tell what our acceleration is?"

"The Hooke type of accelerometer is useless when we neutralize the gravity-apparent," agreed Hammond. "We're going to have some inventing to do."

"I wonder what the limit of our acceleration is," said Jimmy. "It can't be infinite, because the mechanogravitic generator above can take only so much—"

The inertia switches went out with startling clicks, and the weight-loaded rheostats whirred home to zero. Relays danced madly as the acceleration went to zero once more.

"Right back where we started from," came the pained voice of Sandra Drake. "Can't you birds think of something practical?"

She thrust the main control home once more, hooking it up to the automatic circuit that Larry had installed. The acceleration began

again. "Now we'll have some more jackrabbit drive—but with a longer jump," said Drake cynically.

"We'll have to limp all the way to the Lens on this drive," said McBride. "It isn't too good, but I can't see—"

"I'm tired of this jerky stuff," said Sandra Drake entering the room. "It seems to me that you should be able to duplicate the mess you have here by something similar up in the nose."

"Yes?" asked Steve Hammond politely. He was interested but not impressed.

"What I'm trying to say is this: Wouldn't a set-up similar to this space-eating drive also be capable of exerting mechanical attraction, thereby getting you a constantly increasing neutralizing force?"

Steve thought that one over. "Not bad. Not bad at all!"

Jimmy jumped to his feet. "It'll work, Steve. We'll have to induce the mechanogravitic force in a cupralum bar by secondary gravitic radiation, but it is a known phenomenon. Drakey, that's top!"

"Except for one thing," said Larry. "We're fresh out of magnetogravitic generators. Aside from that, we can run this heap all the way to Sirius."

Pete said: "Yeah, and if we did have one, we'd still be short a few thousand alphons. The alphatron won't carry another generator, nor will the little one upstairs." He grinned at Sandra. "We're not tossing cold water on your suggestion. It'll work—but not right now."

"Then it was good?" asked Drake with the first question of honest awe she had used in years.

"Perfect," said McBride, cheerfully. "But not quite complete. We won't censure you for that, however, since we know that you haven't been hanging around space-warp engineers for the last ten years. You couldn't have known that this mag-grav generator will do service on both ends. All we have to do is to direct the output on a two-lobe pattern instead of a single-lobe pattern, and set our induction bar up above in the field of the mechano-gravitic we've already got there. Jimmy, change the output pattern of the mag-grav and we'll hike aloft with the cupralum bar." He bowed at Sandra. "Thanks to that one, we'll be moving right along!"

Pilot Drake sent the power lever home at thirty feet per, and watched the accelerator climb to exactly thirty, where it stopped and hung. Minutes passed, and the meter read constant.

Steve Hammond smiled wider and wider as the minutes added into a quarter hour. "I think our cupralum hull is helping," he said.

"How?" asked Pete.

"Why, it is collecting enough leakage-warp to create a nice large warp of its own—in which we now travel, and in which the accelerometer reads only that factor 'R' of Mac's. That meter reads the rate of change of acceleration. Drake, step it up to sixty."

Sandra advanced the drive, and

the meter went up to sixty even.

"We're on the ball," said Hammond.

"We sure are," said McBride, passing a forefinger over his cheek. "It's hot in here."

"I know. And you can call the Lens and tell the Doc we're on our way."

"I tried that. The lines were busy, so I shot 'em a 'gram. They know now that we're coming."

"I wonder if your math is correct," said Steve.

"Why?"

"If it is," explained Steve, "we'll be halfway to the Lens in three hours from start—no, wait a minute. We're running at sixty feet now. That means a little better than two hours! But if they are correct, we'll be hitting almost two times the speed of light. That is not possible."

"I think we'll do it," said McBride. "After all, we're in a space warp, and no one really knows whether the laws of the universe hold in a space warp. Drake hit the Lens at about ten thousand miles per second, was stopped in time to get to one of the fore lens stations, which must have been terrific deceleration—unthinkably high—and it didn't even muss her hair. We'll know in a bit when we are supposed to hit the speed of light."

"Then for the love of Mike, what is our limiting velocity?"

"The same as any of the gravitic spectra. Gravitic phenomena propagates at the speed of light raised to the power of 2.71828— That's our limiting velocity."

"Want to make any bets?"

"I don't mind. My guess is as good as yours."

"Better," admitted Steve.

Below, in the pilot room, Sandra Drake was having a state of nerves. She was alone in the driver's seat of a ship destined to exceed the speed of light, and she was scared. For some reason, the men who professed to shy at danger were arguing the possibilities of running above the speed of light while she, who had lived the life of an adventuresome girl, a daredevil, was worrying. She listened through the communicator at their argument and cursed under her breath.

They were going at it in a pedantic manner, hurling equations and theorems and postulates at one another like lawyers with a case for the supreme court, not men who were heading for God-Knows-What at a headlong pace under an ever-increasing acceleration.

There were all sorts of arguments as to the aspect of the sky as the speed of light was approached. And how it would look at a velocity of more than light. This went on for some time, with Steve Hammond holding out for blackout and John McBride holding for a sky that crawled forward due to the angle-vectors created by the ship's passage across the light rays, until the entire sky appeared before them—all the stars in the sky would be in the hemisphere in front of them, no constellation recognizable.

"But your supposition does not recognize the doppler effect," ob-

jected Hammond. "Visible light will be out of the visible spectrum."

"True enough. But solar radiation extends from down low in the electromagnetic scale to very very high in the extra-hard UV. Visible spectra will be dopplered into the UV, all right, but the radio waves will have an apparent frequency of light, and we shall see the stars by that, I think."

"With no change in color?" asked Hammond skeptically.

"There will be a change in color, naturally. We'll observe them in accordance with whatever long waves they emit; they will in no way resemble the familiar stars we know."

"How's a poor devil going to navigate at any rate?" asked Larry. "With everything out of place—or invisible—what's he going to use for signposts?"

"In normal usage, the super drive will be fine. We've been using autopilots for years and years, setting up the whole course from takeoff to the last half hour of landing. We can still do it. We'll be flying blind, but so what? We fly pretty blind as it is; no one gives a rap about the sky outside. Instrument flying is our best bet."

"Well," said Hammond, "we'll see it soon enough. The color of the stars behind us are changing right now."

"They should. We're running at three quarters of light—and, Stevey Boy, they're still visible!"

Silently they watched the sky. Dead below them, a tiny black circle appeared and the stars that once occupied this circle were flowing away from it radially. It expanded, and the region of flow spread circularly, and the bowl of the sky moved like a fluid thing towards the top of the ship until the stars at their nose were crowding together. Stars appeared there, new stars caused by the crossing of electromagnetic waves from the rear, and the sky took on an alien sight.

For a long time the stars seemed to tighten in their positions above the ship, and then the warning bell rang and the ship swapped ends easily and the bowl of the sky was below them.

Then it began to return to the fore observation point of the *Haywire Queen* as the velocity of the ship dropped. The crawl started, and the black circle diminished until it was gone. The stars continued to regain their familiar color as the *Haywire Queen* approached the normal velocities used by mankind.

Five hours after their start, the *Haywire Queen* slid clumsily to a stop beside Station 1 and made a landing. She arced a bit, since the charge-generating equipment did not have the refinements of the Lens flitters for making the ship assume the charge of the destined station. But the arc was not too bad, and within a minute after the *Haywire Queen* touched the landing deck, John McBride was knocking on the door of Dr. Caldwell's office in the hospital.

Caldwell came out of the inner door to answer the summons, and

he looked up at McBride and went dead-white.

"Mac! It's you?"

"Naturally," smiled McBride. "How's Enid?"

"How did you get here?" demanded Doc.

"That's a long yarn, Doc, and it includes a whole engineering program, exceeding the velocity of light, and using a space warp as a traveling companion. How's Enid?"

"She was none too good, but we'll have her through now. Come on in!"

"First tell Tommy that the *Haywire Queen* is on the landing deck and that they're to have anything they need if we have to kill the lens to give it to them!"

"I heard that, John," said Tommy, coming in the door. "It's done." He turned on his heel and left immediately.

John approached the bedside. "Enid," he said softly.

Enid's eyes fluttered. A wave of pain passed across her face and she tried to move. McBride looked at the doctor.

"Go ahead, John," said Doc.

"Enid. I'm here. It's John."

Enid opened her mouth, gasped once, and said in a very weak voice: "John? Here?"

"Nowhere else."

"But you . . . were on . . . Pluto—?"

McBride thought that one over. How could he explain? He decided not to, and said: "I've been coming back for a long time, Enid. I'm here now—that's all that counts."

"Yes, John," said Enid.

"She'll be all right now," said Caldwell. "That's what she needed."

Another wave of pain crossed Enid's face, and a nurse came with a filled hypo.

Caldwell drew McBride out. "Another half hour will see her through," he told John. "You wait here and everything will be all right. I know that now, thank God."

Caldwell left McBride to re-enter Enid's room.

Steve Hammond and Sandra Drake entered the office. "How is she?" asked Hammond.

"Doc says she's going to be all right, now. I've seen her and Doc says she's perking up already."

"Good!" said Steve. "Drake, that was a nice piece of navigating. You hit Station 1 right on the nose."

Sandra felt a whole library of emotions, mixed together. She smiled a sickly smile and said: "I should have. I've been here before, remember?"

Hammond ignored the statement because he thought it sounded too much like bluster. "Drake," he said, "the *Haywire Queen* is about ready to hop for Terra. Do you feel up to running it in?"

"Steve," snapped Sandra Drake, "I'm not going to let any idiot male handle the *Haywrie Queen*, and don't you forget it! After all, I'm the only pilot in the solar system that knows how to run her! I'll personally strangle both you and whomever you think you're going

to get for that job, understand?"

Sandra turned and left.

"What in the name of the seven hells has got that dame?" asked McBride.

"There are a lot of ways to kill a cat besides choking it to death with cream," said Hammond thoughtfully, "but the latter way is just as effective and sometimes a lot easier. Our she-barracuda has just hit the one thing that she can't fight."

"Huh?"

"Sure. We gave her credit for doing a good job. Willing, honest credit. No matter how she may profess to despise our opinion, she can't yell 'Liar' at us because that would mean that she thought that the praise meant nothing. She's got to agree with us, or deny that she did anything worthy. And she's been living in a world of her own, trying to prove that she is the stuff. So—get me?"

"Uh-huh, I suppose so. How're you set?"

"Pretty good. We've swiped all of your spare alphatrons and a couple more gravitic generators, and we'll butter the job up a little so that we won't worry about overloading the alphatrons. That'll take us an hour or so. How're you doing?"

"I dunno. Doc said wait here—and dammit, I'm running out of fingernails, cigarettes, and patience."

"Well hang tight. I'll be back from time to time to see how you're getting along— Hi, Doc? What's the good word?"

"It's good," sighed Dr. Caldwell.

"Honest?" yelled McBride. "Enid's O. K.?"

"Fine. From here on in it's a breeze. Oh, I forgot to tell you. She's had her son."

"She's what?" yelled McBride.

"Son. John McBride Junior, I presume. He's an ugly, carrot-colored, monkey-faced, repulsively wrinkled little monster, but Enid says he's the image of the old man."

McBride looked at Caldwell, and then rushed out to Enid's room.

"Image of the old man, hey?" asked Hammond.

"He'll develop," said Dr. Caldwell. "Junior is a Latent Image!"

THE END.

IN TIMES TO COME

It's not only lack of room that has eliminated the Analytical Laboratory these last issues; it's lack of adequate letters to form a fair estimate at the time of going to press. Astounding hasn't been appearing on time due to shipping difficulties. These difficulties are being cleared up as rapidly as the most heavily gunned Army, the largest air force, and the most overwhelmingly potent Navy this planet has ever seen, can attend to it. It irks us no less than you that we can't keep promises on date of arrival; there is only one group of readers, however, who have a right to object if a can of C ration gets shipping priority over a copy of Astounding. So far, we've heard no objections from them. The An Lab will return next month—on an all-votes-in basis instead of an "early returns indicate . . ." arrangement.

Some while back I remarked editorially that attacking the United States with mechanized war was inherently an unhealthy idea. Like a man attacking a lion on a tooth-and-nail basis—the lion's got more teeth and lots more nail. The mechanized weight of American power is really beginning to swing into action now, proving the argument. But—how *could* you attack America? Past experience indicates that the Nazis' successors in control of Germany will probably try. German citizens seem to like monomaniac rulers—with a mania for world conquest.

Murray Leinster has a long novelette next month—"Trog"—that has an astute suggestion on that problem. He's right, too—it's one form of attack we might fall for—and before!

THE EDITOR.

"This Means War!"

by A. BERTRAM CHANDLER

A British merchant mariner who knows whereof he speaks suggests that the waters of the North Atlantic might seem unfriendly to unwary visitors! Say a ship from Venus came down there, all unknowing—

Illustrated by Williams

Captain Kra Krojar squatted stolidly in the anteroom. Had he been a native of the Third Planet he would have looked worried, as worried, perhaps, as he undoubtedly felt. For, as senior surviving officer of the catastrophic expedition, the thousand and first, it was, to the Third World, he was waiting to appear before the Court of Inquiry.

But the amphibious people of

Karkra didn't show emotion, they couldn't, any more than a frog. And by reason of his posture, and because of his greenish, glistening skin, the captain looked like a giant frog that had decided to become a man. Or, perhaps, like a singularly unprepossessing man who had acquired webbed fingers and toes and decided to become a frog.

The interior of the huge room was a monotone of green. The walls were festooned with a slimy, green moss. The stone floor was damp and covered with a mat of algae. The only contrasting colors were the intricately worked necklets and bracelets of gold and gems which denoted Kra Krojar's rank and profession, and which were the only clothing or ornaments he wore. Even the hot, misty air was tinged with green.

A native of the Third Planet would have declared that the place stank. He wouldn't have been far wrong.

Abruptly, a sliding door at one end of the room opened. A council messenger entered, approached the captain with a peculiar gait, not quite a walk, and not quite a hop.

"The council awaits you, lord," he croaked.

Had his face been capable of showing emotion it would have reflected awe, almost reverence, for to the people of Karkra the Astronauts, upon whose cargoes the civilization of Karkra was now almost entirely dependent, were as gods.

The captain rose to his feet and followed the messenger into the council chamber.

At the head of the low, stone table squatted Kor Korkos, lord president of the council. On either side were the lesser councilors, twelve in all. The captain took his place at the foot of the table.

Before Kor Korkos was a pile of yellow, parchment sheets, covered with black characters. There were one or two books of the same material.

"I have here your log books, captain, also your report," he croaked. "I want you, however, to tell the council in your own words of your experiences. Much depends upon this meeting."

"As you wish, great lord.

"My lords of the council, the thousand and first expedition to the Third Planet blasted off from Korch—"

"That is not important, captain. I have your log. Start from your landing on the Third World."

"As you wish, great lord.

"The fleet landed in the Kralen Sea, which, as you know, is in the Northern Hemisphere. None of the surface ships of the natives were sighted.

"Under the orders of Commodore Karkan, in his flagship *Kraken*, the six ships proceeded north for the submarine mines. All hands were given every opportunity to disport themselves in the water, in order that they might recover from the long period of unnatural conditions in the ships. The usual medical precautions were, of course, taken.

"The trip was without incident until the morning of the third day.

I was called by Lieutenant Karp, who, at the time, was Officer of the Watch of my ship, *Kargara.*

"When I came on deck, a remarkable sight met my eyes. Approaching us over the rim of the horizon was a veritable sea city, at least forty great surface ships and many smaller ones. Some appeared to be of the type which have been in existence for the past few years, propelled by the boiling of water by the oxidation of fossil carbon, but many, judging by the absence of smoke and their efficient appearance, were of a new design. To judge by the noise picked up by our hydrophones they were all propelled by that peculiar screw propeller favored by the natives.

"Wisely, the commodore gave the order to dive.

"Unfortunately, it came a little too late.

"Some of the watchmen of the floating city must have seen us, or, perhaps, they had some detector device which warned them of our presence.

"The main body of the ships, as seen through our periscope, turned sharply away from us, and one of the small craft approached at a high speed.

"Even then we had no apprehension of danger, not thinking that the Drylanders, who regard the sea merely as means of transport, had any method of hitting at us whilst we were submerged.

"Cannisters containing some powerful chemical explosive were dropped and thrown all around *Karaga,* commanded by Captain Karart. The concussion was terrific, especially as the devices had some kind of fuze which detonated them under the water. *Karaga* was literally crushed, and sank like a stone. There were no survivors.

"The rest of us followed her to the bottom as fast as we could. We could feel the blows on our sides as more of the bombs were dropped above us. *Karkara* reported that her outer hull had been pierced and that the insulation space was fast filling with water. Her crew was obliged to don pressure suits and abandon ship. They were distributed among the four remaining vessels.

"That night a conference of captains was held aboard the flagship. It was decided to continue our voyage to the mines, and to carry on with our fishing and seaweed gathering. All officers and ratings were to be warned to report at once any deviation, however small, from what we have come to regard for years as normal conditions for the seas of the Third Planet.

"At the same time, all of us were enjoined, in the event of our becoming separated from the main body of the fleet, to do nothing that could possibly be construed as hostile action by the natives.

"For the remainder of the night we continued our journey under the surface.

"At daylight we surfaced, our hydrophone watches having assured us that there were no native ships in the vicinity.

"Whilst we were scanning the

horizon for signs of smoke or other indications of shipping, a loud humming, or buzzing, noise was heard. We scanned both sea and sky, but nothing was seen. Then, from right out of the sun, a machine dived at us. What its method of propulsion was, I cannot say, but it had a fishlike body and two long, rigid, wings or fins.

"Streaks of fire shot down from it. They appeared to be some kind of flaming projectile. None penetrated our plating, but several officers and ratings on the decks of all the ships were killed or badly injured.

"The order to dive was given at once, but too late to save *Karnara*. The Drylanders' airship released several objects containing chemical explosive, one of which struck her just over the engine room. The shock of the explosion must have deranged her converter, as she went up in a cloud of fragments. There were no survivors.

"Another conference was, of course, held.

"The commodore put forward the suggestion that we should try to capture one of the natives' ships. It was obvious, he said, that, for some reason, they had opened hostilities against us. Perhaps some natural catastrophe had forced them from their natural habitation, so that they were putting to sea in what we had come to regard as floating cities.

"Perhaps what we had seen was merely a mass migration from one land mass to another.

"But whatever it was, they had expected our coming, and seemed to be determined to drive us from their seas. The seas, which, by right of centuries of conquest and usage we had come to regard as our own.

"All of us were in favor of the commodore's proposals. It was decided that the next surface craft sighted should be chased and boarded. We were confident that, at close quarters, the repulsively soft and weak natives would be easy to subdue, even as they always have been in the past.

"So the survivors of the fleet lay beneath the surface, a close hydrophone watch being kept for the unmistakable beat of the Drylanders' screw propellers.

"On the second day of our wait one of the floating cities passed slowly over us.

"The third day, the sea seemed empty.

"The fourth day, a single surface ship was heard, slowly approaching. It passed over us. The order to surface was given over the hydrophones.

"The ship, we saw at once, was one of the older types. Had she turned to ram, we should have dived at once, fearing an attack with those hellish cannisters of explosive.

"But she turned away, and we urged our engines to the utmost speed in pursuit.

"Figures could be seen running about her decks, as if in panic.

"Then, from her stern, came a bright orange flash. We thought, at first, that she was using some

kind of primitive reaction engine to increase her speed.

"But a splash in the water just ahead of Captain Krorkror's ship, *Kororor,* disillusioned us. The flash came from some kind of tubular device for throwing projectiles.

"The next missile was a direct hit. The explosion killed the captain and three of his men, as well as penetrating the outer skin. Hit after hit followed until the surviving officers got the ship under control again and put her on a course directly away from the Drylanders'. They could not dive, for fear of flooding the ship.

"We, of course, accompanied her.

"Just as we appeared to be getting out of range of those murderous projectiles, another of the flying ships appeared. It may have been chance, or it may have been summoned in some way by our enemy.

"The commodore ordered a crash dive, and the unfortunate *Kororor* was left to her fate. There were no survivors."

Here one of the lesser lords of the council interrupted the captain.

"There is a certain monotony about your story," he croaked. "Surely there were *some* survivors."

"Not so, lord. The pressure waves set up in the water by the explosion of those cannisters were such as to internally crush any living thing in the vicinity. It is a fact worth placing on record that, each time, hundreds of dead and dying fish were brought to the surface.

"But, with the gracious permission of the lords of the council, I will resume my story.

"As soon as we judged that conditions were reasonably safe I left my own vessel by the air lock and boarded the flagship.

"In her control cabin I conferred with the commodore, his flag captain, Kor Kororph, and his senior officers.

"I was in favor of continuing our voyage to the mines with all dispatch, loading the absolute maximum of cargo, and returning at

once to Karkra. A properly equipped expedition could always be sent to investigate after our return.

"But the commodore held that there was always the possibility that both the remaining ships might be lost by some hazard of interplanetary navigation, which would mean that the next expedition would walk blindfolded into the same trap as ourselves. In this he was supported by his officers.

"He urged that a complete and thorough investigation be made.

"The plan of campaign was daring. We were to cruise, submerged, off the coast of the island of Kraskra, which is, as you know, on the Eastern shore of the Kralen Sea.

"We knew it to be thickly populated, also that it was, or had been, one of the focal points of the Drylanders' surface traffic.

"As soon as we picked up the propeller beat of a ship on our hydrophones we were to follow her right into harbor, under the surface, of course.

"I objected that the whole scheme was unconstitutional, as my own officers had had no say in the matter. Furthermore, it was putting our head into the Krorkror's jaws.

"However, I was overruled, although I insisted on receiving the commodore's orders in writing. On my return to my own ship, a course was set for the island of Kraskra.

"We were to wait at the entrance to the straits between the island and the island of Krorkara, which lies a few miles to the westward.

"We hadn't long to wait. Almost as soon as we had taken up our station, the noise of an approaching surface ship was heard. We let her pass above us, then we fell into line behind her, keeping her ahead by our hydrophones. For two days we followed, and then my port fin began to develop defects. I proposed to the commodore that I stop at once, and carry out repairs before the trouble became serious. He agreed, ordering me to follow as soon as I got under way again.

"The sea is quite shallow between the two islands, making work possible unhampered by pressure suits. I sank to the bottom and ordered Technicians Krortor and Krardar to commence repairs.

"I myself was with them, inspecting the damaged fin, when there was a tremendous detonation in the water from the direction which the flagship had taken. All three of us were badly shaken, in fact Technician Krardar later died from his injuries.

"As it appeared that an attack was developing, I returned on board the ship, taking Krardar with me. Krortor volunteered to swim to the locality of the explosion and investigate. He has been recommended for promotion, as you will see from my report.

"He was gone a long time, and we feared that some evil fate had befallen him.

"I had decided to get under way and set my course for the mines when we heard him tapping for admittance.

"As we had expected, he told us that the flagship, and all her complement, had been utterly destroyed. But he told us more.

"On the sea bed he had discovered several metal objects, obviously of artificial construction. One of these he had examined, very carefully. It consisted of a large charge of chemical explosive, which was detonated by a truly hellish device.

"A magnetic needle, deflected by the presence of any large mass of iron or steel in the vicinity, completed a circuit and fired the charge. Since the Drylanders' ship had passed safely over the traps, it was obvious that they were aimed against us.

"With great caution we retraced our course through the shallow sea, relays of the crew being sent to swim ahead and warn us of the presence of any more of the traps. This precaution, I am convinced, saved us from the flagship's fate, as no less than four were discovered right on our line of advance.

"As you are aware, lords, we proceeded with all speed to our submarine mines, running submerged most of the way. Here we loaded as much cargo as we could possibly lift.

"After the prolonged submarine operations, it was necessary to surface in order to replenish our air supply.

"And, as we broke surface, we were given more proof of the hostility, and ingenuity, of the natives.

"Hardly more than a stone's throw away from us, another ship broke surface. At first we thought that she must be one of our ships, operating unknown to us upon the Third Planet. Differences of design soon disillusioned us.

"By this time, all of us were ready to run from shadows. 'Out atmospheric fins!' I cried. 'Planetary Drive!'

"As we roared up from the sea, our exhausts turning the water into steam, we saw that the strange submersible had attacked. A slim cylinder, which traveled rapidly just below the surface, had been discharged at us, and passed right through the spot where we had been a second before.

"Nothing now remained to detain us upon this hostile and perilous world, but I decided to make a sweep of investigation over Kraskra and the mainland lying to the eastward.

"It was dark when we approached the land.

"It looked at first as though our theory had been correct, that some cataclysm had driven the Drylanders from their natural habitat. For, where once our ships had reported innumerable lights of cities and towns, was total darkness.

"But, as we approached what our maps, and previous experience, told us was the locality of one of their largest cities, intense beams of light stabbed up at us from the ground. Almost at once, projectiles of all kinds filled the air around and beneath us with their explosions. Only our speed saved us from being hit. Out of the darkness came

small, fast airships, spitting fire from their noses.

"'In atmospheric fins!' I ordered. 'Interplanetary Drive!'

"And so we swept out of the atmosphere of the Third Planet and drove Sunward to Karkra."

"And what are your conclusions, captain?" croaked the lord president.

"Just this, great lord.

"We must attack before it is too late.

"It is evident that the natives had prepared against our coming. Perhaps overpopulation has forced them out on to the seas, in any case it is evident that their oceans are no longer wide enough to hold both races.

"Their submersible ships have spied out the location of our mines, their shallow waters have been sown with deadly traps.

"But, great lord and lesser lords, here is the deadly peril. It is only a few short years since their ships, as from time immemorial, were propelled by the winds and the power of the Drylanders' puny muscles. In those few years their science and technology have made vast strides. They have conquered both the sea and the air of their world. Their chemistry must be of a high order.

"And remember this well, our only scientific achievement since the dawn of interplanetary travel has been the atomic drive.

"Yes, we must build a fleet of ships, armed with every weapon that our science can supply, armored against all the weapons of the Drylanders. You know, lords, that once our supply of raw materials

from the Third World is cut off, our civilization must crumble. We shall return to the swamps.

"If we are not blasted back to the swamps, that is, by the Drylanders.

"Attack while there is yet time, before our skies echo to the roar of alien rockets, before our cities dissolve in flame and smoke, before our submarine nurseries are crushed into a bloody shambles.

"Attack while there is yet time!"

The lord president of the council surveyed the ranks of the lesser lords.

At last he broke the heavy silence.

"THIS MEANS WAR!"

THE END.

"The Winged Man"

by E. MAYNE HULL

***First** of Hull's first two-part serial. In a world all water, a kidnaped submarine would be at home in a strange war between the two types of man of a million years hence. But—which type to aid? The Winged Ones, or the Amphibians—*

Illustrated by Orban

In the darkness, the bird swept the submarine from stem to stern, swooping along almost at deck level, and about a dozen yards to port. It was an enormous black shape; and Kenlon, who saw the movement of it against the clouded sky, turned and watched the blurred thing as it swerved away, and vanished, flying strongly, into the northwest.

Kenlon half faced about to remark on its passage to Quartermaster Reichert, at the electric

steering gear. He thought better of it, and muttered under his breath:

"Wrong direction, birdie! If you want to stay alive, the route is not in the direction of Tokyo. In fact—"

He stopped, frowning. Funny, he thought, *funny!* He picked the phone out of its waterproof box.

"Tedders at this end," said the voice of Lieutenant Tedders.

"It's a game I'm playing," said Kenlon. "And I ran out of fingers to count. How far are we from the nearest land?"

"You waken me, sir," said Tedders indignantly, "out of the soundest sleep I've had in ten week—"

Kenlon grinned. There was a long-standing lottery among crew members, which would be won by the first man who, when sent to rouse Tedders for special duty, found him asleep. The *Sea Serpent's* third officer had the astonishing faculty of waking up a few seconds before he was called.

No one had ever seen him nodding when he was on duty. He was on duty now.

Tedders finished his plaint; then: "In response to your question, Mr. Kenlon, the Pacific is perhaps the largest body of ocean in this hemisphere; and the U.S.S. *Sea Serpent*, heading out from base on its second mission against Imperial Hirohito's marine forces, is now some twelve hundred miles from the nearest known atoll. Maybe that's a little exaggerated."

"Dazzle me further," Kenlon confided, "with your knowledge. String me off quite casually the names of all the large birds you know that can fly twenty-four hundred miles."

"We-e-l-ll, there's the albatross."

He paused; and Kenlon urged: "Yes, yes, go on."

"See here," Tedders said irritably, "I'll have you know that when the war began I was just getting comfortably settled into a large chair with a cushion in the firm of Carruthers, Carruthers, Tait & Carruthers, who were NOT ornithologists. No one will ever be able to give me a rational explanation of how I ended up in this Godforsaken mechanized sewer pipe under the sea."

"Albatross," Kenlon mused aloud. "That's a chap with a twelve- to fourteen-foot wing spread?"

"That's right."

"With a long strong bill, hooked at the end?"

"Huhuh!"

"Fourteen feathers in its rounded tail and very narrow wings?"

"You're getting awfully warm,"

"You'll have to do better than that," Kenlon announced. "It isn't the one. The one I saw had an eighteen-foot wing spread, with rather wide wings—"

"Maybe it's the daddy of all albatrosses."

"—No bill, no tail feathers at all," Kenlon went on, "and a body that seemed awkwardly large even for that wing spread. Question: do bats grow to the size of small airplanes?"

"Question," said Tedders, "do

first officers go batty after they've spent a certain amount of time each night above the hatch? Or is this a case of too much *down* the hatch from a secret supply of joy juice?"

Kenlon, who never drank, frowned. He had, he knew, no business being offended, since it was he who had started the little byplay. To be practically told, however, that he was mentally disembarked was hard taking. He said briefly:

"I'll make further observations, Mr. Tedder, and this time I shall wear my glasses."

He hung up, and stood there in the darkness, staring up into the night sky. The clouds had thickened where the bird had disappeared, but to the southeast, where the moon rode behind white cumulus, there were blue windows through which starlight flickered.

Up in those heights a wind must have been blowing. Because abruptly the moon swam into one of the dark-blue windows. Its light streamed through an opening that widened rapidly. Through the expanding channel, the white, white moon rays poured down onto the submarine, and fired the intensely black sea with a lane of light.

A shadow darkened the face of the moon. Kenlon, on the verge of turning away, glanced up again. Then he gasped. And caught the railing and glared like a madman.

Plainly silhouetted against the moon was the figure of a tall man with wings. The wings were only partly spread; and they were not moving. He seemed to be poised there like a creature out of a nightmare, black as only a shadowed outline could be. Intently he stared down towards Kenlon.

For a long instant, that was the picture, like a "still" taken at night. And then, the legs drew up, the body lost its manlike resemblance.

A great bird swooped out of the path of the moon into the covering darkness.

The minutes trickled by. The long, gleaming supership rolled and hissed through the slow swell, a monster surging at speed through a dark sea.

The Diesels throbbed their heavy music. A head poked up through the hatch.

"May I come up, Mr. Kenlon?" said Tedders.

Kenlon nodded. "What is it?"

Tedders climbed up beside him. "I've been thinking," he said, "of birds with eighteen-foot wing spreads, of an officer named William Kenlon who is famed for his snap judgments as to distance, and whose estimates of the length of ships seen a mile or more away is final. And lastly I've been thinking very hard indeed of a certain guy named Tedders, who isn't bright enough to realize when a conversation is serious." He broke off. "You actually saw that bird?"

It was an apology. Which meant that his final words on the phone had shown his pique.

Kenlon hesitated. He went over in his mind the words he would have to use to explain exactly what his last visualization had been. And

shook his head ever so slightly, grimly.

"It was dark," he said, "and it was over there"—he pointed into the night—"and all I really got was an impression."

"Aeronautically speaking," said Tedders, "I'm only a lightweight. I almost joined the air force—almost meaning that they turned me down flat. But could it possibly have been a very small, slow plane? A midget that spotted us, and is even now rushing back to a Jap carrier to tell 'em all about it?"

Kenlon did not reply immediately. And it wasn't that he considered the other's argument worth thinking about. It was Tedders' assumption that he had been deadly serious on the phone that brought the startled realization—that he *had* been.

He thought intensely: "What did I see? A bird with eighteen feet of wings!"

He found himself, uncertainly, wondering whether the Japs had not succeeded in inventing wing attachments for a human being.

It was a new idea completely; and it took a minute to fix the mechanical problems of such an invention in his mind.

He came out of the brief reverie with the sardonic conviction that he had better say as little as possible. It "made nuts," and that was all there was to it.

He mustered a grin, and stared down at the dapper Tedders. "A Jap carrier this far from base," he said incredulously. "Not since Midway. I—"

"Mr. Kenlon."

It was Quartermaster Reichert. Kenlon half turned, startled by the interruption.

"Yes?" he said.

"Did you send anybody down to the end of the for'rad deck, sir?"

"Did I what?" Kenlon asked.

He twisted. Then he was down on the deck, racing along towards the shape that was clinging to the prow. He could hear Reichert's heavy footsteps close behind him; and somewhere in the rear Tedders was shouting muffled commands down the hatch.

As Kenlon approached, the winged man looked up. In the darkness, his great eyes shone like dull jewels. It was too hard to make out the features of his face, or even of his body.

All that mattered, all that Kenlon concentrated on after one flashing look was that he was in some way fastening what looked like a brassy pie tin to the outjutting edge prow of the *Sea Serpent*.

The metal thing shone and danced with streaking flashes of dimly reflecting light from a now partially hidden moon. Above it towered the crouching man, his wings flapping monstrously from well down behind his shoulder blades.

And he didn't move. He clung there, with a curious desperation, and pressed his metal pan against the metal of the submarine—as Kenlon vaulted over the low railing; and, clutching the flagpole for support, jabbed with his fist.

He struck a very light, fuzzy body, that somehow retreated be-

fore his blow: and then lunged forward. Hands grabbed him; and he was plummetted back over the railing to the safety of the deck.

The creature followed, banged its wings against the air as it dived at him.

Exactly what instant the searchlight went on, Kenlon had no clear idea. He was fighting, struggling with a human body that was as light as thistledown, but as strong as he was.

Great wings beat down at his head. Abruptly, the birdman broke free.

Kenlon had a flashing glimpse of a lean, intent face, with human lips drawn back to show white teeth. Then the slender body was rising away from him, lightly, strongly. For a moment longer, the winged man was silhouetted in the uptilting beam of the searchlight. Then, faster than the shifting light, he spun sideways, and was gone into the darkness to the north.

Behind Kenlon, like an anticlimax, a machine gun began to stutter uncertainly into the night.

Tugging did no good. The shiny pie platelike object clung with an unyielding strength to that hard steel prow.

Sweating, Kenlon looked up to where Lieutenant commander Jones-Gordon was kneeling beside the flagpole holding with strong fingers to Kenlon's right wrist while Kenlon worked with his left hand. Trembling from exhaustion, Kenlon finally said:

"What do you think, sir—a blowtorch to burn it off?"

The commander said drably: "Who'll wield it? The heat may set off the bomb!"

Kenlon hadn't thought of that. Incredibly, he hadn't even thought of it as a bomb. In the tremendous mind-wrenching excitement, he had forgotten everything but the necessities of the moment.

Now, he felt himself changing color. He stared at the object with a bleak horror that faded into a wry memory of the fact that he was a married man with one kid, who had no business getting himself killed.

He shuddered internally, then looked up into Jones-Gordon's eyes. He said with a stiff smile:

"I'm here; I'll do what's necessary."

He raised his voice: "Reichert, bring a blowtorch, and rope scaffolding. Get a couple of men to help. On the double!"

"Aye, aye, sir!"

"It looks transparent; it doesn't look like a bomb," said the commander thoughtfully. He was a square-jawed young man with warm blue eyes. "And besides it's too small to do us any damage. Come up here, Mr. Kenlon."

Kenlon couldn't have made it himself. Jones-Gordon's strong hands pulled his weakened body over the railing; and only naval training made it possible for him to straighten his trembling form, and stand there rigidly.

His superior said unsmilingly: "It's a good thing I hadn't gone to bed. I wouldn't have believed it if

I hadn't seen it myself. Bill, what was it?"

"A man with wings like a bird," Kenlon began.

He stopped. Somehow, thinking about it and putting it into words were two different things. The words jarred, then banged through his brain like flung stones ricocheting. His mind seemed to expand inside his head; his whole body grew taut with the unheard-of reality that was here. He repeated softly:

"A man with wings . . . sir, we must be mad."

Slantwise, out of the corner of his eyes, Kenlon saw the pie tin-shaped "bomb" that the creature had left. And the thought suffered a violent relapse. If there was madness here, it wasn't *of* the *Sea Serpent* and her seventy-five officers and men—Jones-Gordon was speaking again:

"There are several questions which arise: Where did . . . it . . . come from? What is . . . it? What was its purpose? And where is it now?"

The questions remained unanswered, as Reichert and two men arrived with the required paraphernalia. In a minute Kenlon was dangling from the railing, this time without physical strain.

"It's transparent all right," he announced after a little; and the interior looks like an oddly designed radio tube. Get MacRae."

While they waited for the radio operator, Kenlon had time to grasp the eeriness of this scene here in the middle of the Pacific. The glaring searchlight had been shut off. In a darkness broken only by the cautious probings of flashlights, the submarine was like a ghost in an endless black sea.

Now, that the marvelous and intricate warship had slowed to a snail's pace, the breeze created by its movement was nonexistent; and it was hot. Where he was, slung just above the abyss of sea, it seemed even hotter and, as always at night, the area just above water was infinitely blacker.

It was a world apart; and somewhere up there in the cloudy skies, the creature was winging back towards the ship from which it must have come; or, if there was no ship, it—

Kenlon gasped: "Commander, do you realize that there is a possibility it has no other point where it can land *except this submarine.*"

The odd thing was that, after a moment, he had no doubt at all. The birdman would have to come back.

MacRae lowered himself gingerly over the bulging front to the sling on which Kenlon sat. He was a small, chunky man. He moaned softly to Kenlon:

"If only mother could see her boy now. But I rise bravely to the emergency, daring all, promising nothing. Hold that flash at an angle, Mr. Kenlon. I'll look in from this side."

Kenlon obliged silently.

"Definitely not a bomb," MacRae grunted. "Electronic all right, multigrid. Some of the connections

don't make much sense." He broke off. "Huh!" he said violently.

"What's the matter?" Kenlon spoke quickly.

"There's a little tube inside that's just hanging there in the center of a vacuum. It's not attached to anything. Take a look, Mr. Kenlon, and tell me if I'm crazy. Over to the right. 'Scuse me, that'll be left to you."

Kenlon started to bend down, then he straightened. This was no time for games, or lessons in electronics. Before he could speak, Lieutenant commander Jones-Gordon called sharply:

"Mr. MacRae, could that device be used by an enemy submarine to locate us in the dark?"

It was a silly question. It didn't sound silly; Kenlon knew that. But it was. It was possible, however, that no one but himself would realize why.

They had only seen the creature man flashingly and from a distance. But he had fought him. He had felt the soft, fuzzy skin; the great *living* wings had hammered at his head; his fingers had clutched a man's slight but powerful body, a body inhumanly light, not more than thirty-five pounds.

Their minds were already growing vague on the details, on the alienness, seeking some natural explanation, something that fitted in with life as it had been lived for ten thousand years, and particularly as it fitted with the immeasurably ruthless war.

Not so long as he lived would *he* forget the nerve tingling, the amazing reality of what he had seen and touched.

This was no Jap-submarine-inspired plot for sinking American warships. It was—

His mind wouldn't reach down to the depths or up to the heights that hid the explanation.

He heard MacRae say: "There's no power source, sir, no battery. I don't see how it can be used for anything as it is now."

The commander must have reached his decision in advance; for he said instantly:

"Both of you come up. Mr. MacRae, you may return below. Mr. Kenlon, I want to talk to you. Paley"—he turned to one of the two assistant machinists—"burn that thing off, but don't let it drop into the sea. We want it. Munson, give Paley a hand."

It was an action taken, a positivity. In the curious fashion of all decisions, it cleared the air. It was a base from which to work. The menace, the sense of alienness grew dimmer.

When they were alone on the conning tower, Jones-Gordon said grimly:

"Why did he stay? What was his reason for fighting you those few minutes?"

It was not an easy question to answer correctly, but it was one that Kenlon had already considered.

"I think, commander, he wanted to gain time."

"Time for what?"

"He was fastening that . . . well . . . radio device onto our prow. The solder, or whatever welding

process was used, had to be allowed to set."

Jones-Gordon grunted. "Sounds reasonable," he admitted after a moment. "He took grave risks."

He added harshly as an afterthought: "We're not through with him yet."

In the darkness, Kenlon stared keenly at his skipper. He had always thought Jones-Gordon a rather superior business-man type, who had somehow been sidetracked to Annapolis.

His estimate of the officer's capabilities rocketted before this example of adaptability. His earlier opinion, that Jones-Gordon had asked a silly question, had failed to take into account the fact that a commander was required to go to extreme lengths to insure the safety of his ship. And now—

"Have you," Jones-Gordon said, "any suggestions?"

Kenlon shrugged. "We must get that tube off. That's a priority. And I would advise that the deck patrol carry on all night. It would be a great thing if we could catch him alive. Otherwise"—his lips twisted wryly—"we'd better not even report what we saw."

Lieutenant commander Jones-Gordon's voice came dryly out of the night: "I see exactly what you mean, lieutenant. I—"

He broke off, called sharply: "What is it, Munson?"

"Paley asks me to tell you, sir, that the blowtorch won't work on either the thing or the steel around it. Doesn't even get soft, he says. He wants to know what he should do."

It was, Kenlon realized darkly, a fair question.

The night wore on, minute by minute. The *Sea Serpent* had picked up again to cruising speed. The water hissed; the Diesels throbbed potently Kenlon watched anxiously for rifts in the clouds that let the moon come out to stir up the shadows.

But the clouds kept surging back, bringing massed darkness, sometimes reducing visibility to the point where it was almost impossible to see Reichert five feet away as anything but a darker shadow. As for the men pacing the decks—

Kenlon groaned anxiously. He had no more stomach than Jones-Gordon for turning on the searchlights, but it would have been pleasant to be able to see the *Sea Serpent* in all her gleaming length.

"Mr. Kenlon."

Kenlon jumped a little, then felt guilty. He hadn't heard the lieutenant commander come through the hatch.

He saluted. "Yes, sir?"

Jones-Gordon came forward, and leaned on the railing beside him.

"I've been thinking about your advice, Bill," he said in a low voice, "to dismantle an A.A. unit and knock that tube off the ship's hide. The answer is no. Here's why."

Kenlon waited, silent.

The other went on: "The *Sea Serpent* is expendable in action against the enemy; there's no use blinking the fact. We're just one

more pin in a map to *comsubpac.*"

Kenlon nodded reluctantly. He didn't think they were considered quite valueless; they were expected for instance to be a little more careful than the MTB boys, though not so far as their own skins were concerned. In the main, Jones-Gordon's summation was right.

"What has happened here," his superior continued, "is unprecedented. *Think* of it—a man that flies with his own wings."

Kenlon's brain had been staggering around and around that fact for an hour, never quite daring to move all the way in on it. He said nothing, but he felt once more that new respect for this commanding officer of his, who had apparently grasped the situation to the extent that he had finally made up his mind about it.

"Bill, I want you to ask yourself—suppose we all took affidavits on this matter on our arrival at base. They'd believe us; I'm sure of that now. Three of the four ranking officers on one of the new super-subs do not all slip their rudders at the same moment.

"Very well, suppose we went home empty-handed, told our story and were believed—do you know what would happen?"

Kenlon had a pretty fair idea. It was a thought that had occurred to him with most of the attendant details during the past hour. He said:

"Scientists would fire on you, as captain, with all their big guns. You would be verbally speared, and held up as a typical sailor without imagination, made stupid by the habit of obedience to *comsubpac*.

"All this, of course, would die down, because the navy command would come to your defense, and would say that you had done right in thinking first of your men and your ship. From time to time, as the years passed, the matter would be taken up in the Sunday supplements, and the action of Lieutenant commander Jones-Gordon would be at best deplored, at worst castigated. And that *would* be your rank. The navy would somehow keep passing you over when it came to promotions, on the dimly understood conviction that you had failed a test. Is that picture too strong, sir?"

The other said grimly: "It fits in very neatly with one that I conjured in my head."

He broke off tautly: "Kenlon, we've got to capture that fellow. We've got a ship that's taken monstrous risks in its short life; and I frankly don't see how this can be dangerous. The boys are bringing up some netting, and I'm going to have it arranged so that—"

There was a loud cry from the stern; then a shot; and then the sky above the conning tower darkened. Giant wings beating made a violent special wind; there was a wild shout from Reichert and a bellow from the lieutenant commander:

"Hold your fire, everybody!"

The next second they had the birdman. It was not a famous victory. The winged man landed in their midst, and they pounced with a mad abandon. Kenlon twisted one unresisting arm behind the creature's back, and caught at one wing with a desperate will to prevent it from lifting them all into the air.

It didn't even try. The next second, the men with the nets were swarming out of the hatch. The trussing up took about one minute, the lowering through the hatch a little longer; and then—

Kenlon was alone with Reichert. He called down to the desk, a little dazedly:

"What happened, Johnston? What made you shoot?"

"I found him clinging to the bow, sir."

"What's that you say?" Violently.

"I don't know how long he'd been there, sir."

Taut and cold, Kenlon raced along the deck. His flashlight flared. It was as he had feared. There, attached to the bulging stern was what looked like an exact duplicate of the "radio" tube on the prow.

Over the phone, he got Tedders to call the commander. Jones-Gordon's voice came on the receiver a minute later. Kenlon explained what he had discovered. He ended with a quietness that belied his jumping nerves:

"Apparently, sir, he completed his mission against us, and then,

as there was no other place to land, he surrendered."

There was silence; then:

"I'm sending Mr. Tedders up, Mr. Kenlon. I want you to come down here. Perhaps your command of languages will help us understand what this fellow is trying to say."

It was an eerie scene that Kenlon found. The birdman had been released from the imprisoning nets; and he had had time to smooth out his ruffled feathers. He stood at ease in the central super-secret cross fire torpedo room, facing the throng of his captors.

Staring at him, Kenlon briefly forgot danger, forgot everything else. Somehow, all his previous thoughts had been influenced by the night; he had believed himself to be adjusted to acceptance of this thing.

He wasn't. Here, under the blazing lights, the incredible seemed exactly that. His brain started to sway, his eyes bulged from their sockets, his whole body felt staggered and tense.

With an enormous effort, he caught himself.

The creature man was shorter than he had thought, not more than five feet. His chest looked deformed. It was narrow, and projected like a bird's breastbone. Except for that the body was normal enough, human enough.

Kenlon couldn't see where the wings joined the body, but the wings themselves were in length a little over eight feet each, folded now into two sections, in which position they projected only two feet above the man's head.

The wings were gray, streaked with red and blue. The body was a grayish white, covered with a fine down; the face was white and sensitive looking, with very large eyes.

Kenlon jerked himself out of that detailed examination, and turned shakily to Lieutenant commander Jones-Gordon:

"Sir, what about those two tubes?"

The lieutenant commander stared at him steadily. "You know my course, Mr. Kenlon," he said finally, curtly. "For your information, however, I have ordered Mr. Tedder to dismantle one of the A.A. deck units and to destroy *one* of the tubes. We should hear the shots in about ten minutes."

It was not absolutely satisfactory. The gun should have been readied earlier as a precaution, even if no immediate action was contemplated. Now that the decision was made delay could mean—well, what could it mean?

In spite of his uncertainty, the conviction came that it was going to be the longest ten minutes in the five weeks since they had last been depth bombed.

Kenlon grew aware that Jones-Gordon had not stopped speaking:

". . . We've already tried seven languages on him; and each time he answers in a tongue that has no resemblance to any of them."

Kenlon did not need to ask what the seven were. Jones-Gordon

spoke the halting French and German one picked up in classrooms; and there were five national origins among the men: Greek, Polish, Dutch, Russian and Spanish.

His personal German and French wouldn't be needed. Which left only his smattering of Japanese, Cantonese-Chinese, Italian and Arabian to test.

He started with Japanese. It was his usual lame effort; and the reply it elicited was both startling and depressing.

The answer was dulcetly musical, a very high, sweet tenor, clearly articulated, but sounding in his ears the purest gibberish.

Kenlon wasted no time on his other languages. His watch said it was still seven minutes till the three-pounder was due to go off.

He tore out his pencil and notebook, sketched rapidly a rough design of the submarine, and drew the two electronic tubes in at the points where they had been fastened, with arrows pointing at them.

The birdman took the notebook, glanced at the drawing, and then, with the barest hint of a smile, nodded. The smile was tinged with a curious anxiety, but it disturbed Kenlon more than anything that had yet happened. He had a feeling that the creature was indulging in a sardonic humor.

The impression lasted only a moment; and then the winged man was reaching for the pencil. Kenlon surrendered it; and watched as the man drew swiftly, deftly, on the notepaper.

It was Jones-Gordon who took the little book when it was finally extended. He frowned at it, then showed it to Kenlon. There were two submarines on the sheet now; and the second one, which had been drawn by the birdman, was a much better replica of the *Sea Serpent* than Kenlon's had been.

In spite of the resemblance, Kenlon's mind jumped stubbornly to the idea that they were being advised that there *was* a second submarine nearby.

It was only after a long moment that he noticed that an open hatch had been added to his sketch, but that the hatch was closed in the birdman's own drawing.

"Sir," he gasped, "he wants us to batten down."

The birdman was reaching for the notebook. The lieutenant commander surrendered it gingerly; and once more the creature sketched rapidly with the pencil.

There was no hint of a smile now on his fine, though rather sharp, features. His face was intent, almost tense; and the drawing was literally flung at the commander, so swiftly was it thrust.

It was a picture of a submarine tilted, and in the act of submerging. The two officers looked at each other. Kenlon said unsteadily:

"I think, sir, I'd better get up on deck to give Tedders a hand."

No word of objection came from Jones-Gordon; and so Kenlon was at the door when the light blazed in his face. *In his face*, though, in front of him was only the solid steel door. The light was pouring

through the door, and seemed to originate at a distance.

Instantly, it blinked out, but the fantastic thought had come to Kenlon by the time he reached the hatch:

The tubes! The tubes had lighted; and their intense palpably neutronic glow had poured through four intervening steel walls. He hadn't seen the second tube at the other end of the sub but—

It didn't matter. Here was the crisis.

Outside, the darkness had lightened. The moon was a great, pale orb in a widening blue pond of sky. For miles now, the sea was visible, a black undulating field with streaks of light showing here and there through the intense velvet.

Against that black, and in that light, the submarine was a long shape of gleaming metal, making a foaming path in a sea that heaved and sank, and heaved and sank.

At the forward end of that shining, silvery shape, four men were engaged in setting up a three-pounder gun. Ack-Ack.

That was the facet of the whole vast scene upon which Kenlon's strained senses fastened.

The gun, the vital gun, was almost ready.

Kenlon sent an uncertain glance back down the hatch. And felt a little shock of surprise that no one was following him up. He hesitated, his mind hard on the sketch the winged man had drawn.

Hesitation ended. "Quartermaster Reichert," he commanded, "transfer steering to the control room."

"Transfer steering to control. Aye, aye, sir."

Kenlon lowered the hatch into place after Reichert had gone down, and manipulated the electrical locking mechanism. Then he was plunging down to the deck. He shouted:

"Lieutenant Tedders, fire the instant you are ready. *Fire!*"

The flash was red against the uneven sea; the explosion sharp and loud above the muffled thud of the Diesels.

The gun banged metallically as it recoiled and fell over on the steel deck. The men began to right it, while Tedders poked a flashlight at the "tube."

"Missed!" he groaned.

Kenlon came up. "You didn't miss. I saw the splash of the shell to starboard. It was deflected."

He thought: *Nothing* could be that hard. Surely—

He whirled frantically. "Hurry with that gun. I'll fire it this time; and let's try to keep her going. You're sure the shells are nonexploding?"

He didn't wait for the answer. He almost felt the three shells he fired strike. He saw the three splashes, far to port. Then the gun fell over. He cried to the men:

"Again! Get it up again!"

To Tedders, he said: "At the very least we'll knock its mechanism out of alignment by concussion. We—"

He had swung with Tedders behind the perspiring, laboring crew-

men. And, just like that, they were skeletons, still working there, still standing there.

The light from the tube flowed through them.

But this time it didn't blink off.

Through their bodies, through the gun they were loading, through the intervening projection of the deck, came the glare of the tube.

It was a white glow, so fierce it threatened to burn Kenlon's eyes. Instinctively, he brought his hand up in a self-protecting gesture. He had time to see the bones of his arms and his fingers. And then—

Then he was struggling, choking, fighting in an appalling depth of warm water.

Kenlon held his breath. His throat stung from the water he had swallowed. His whole body felt torn by the cataclysm of coughing that threatened to break out any instant, and break down the terrible resistance of his clenched muscles.

And all the time he could feel his body rushing upwards towards the surface. He began to swim frantically up, up, up. Even then in the midst of that prolonged combination of agony and effort, the thought came, the deadly mind-wrenching thought:

What had happened? What *could* have happened?

Like a shot from the gun he broke the surface, fell back under, then came up clutching for air with his lungs and his hands. His body shook and ached with the wracking labor of his coughs; the water churned as he fought to keep his head above the leaping spray.

Vaguely he was aware of a mighty roaring of water somewhere in the near distance behind him.

The thunder subsided, but a series of giant waves smashed him with a sudden violence, swept him along at express pace, and almost engulfed him.

He survived; somehow he survived. The violent seas quietened. He disgorged the sickening water he had swallowed, shook the nausea out of his body, and looked palely around him.

A dozen feet away a man's head was bobbing up and down in a rhythm with the choppy beat of the sea. Beyond, about a mile distant was a long, low, gray shore, the drab general effect colored here and there with the green of sparse vegetation.

The shore stretched on flat and unbroken under a cloud-filled sky to the horizon on either side.

The whole land scene was strangely, unnaturally repellant in some indescribable way.

Uneasy, Kenlon turned away from it, once more saw the man's bobbing head—and his paralyzed brain came to life.

Tedders? And the men? And the *Sea Serpent?*

The thoughts were like a succession of special pains. With a gasp Kenlon whirled in the water.

"Dan!" he shrieked. "Dan Tedders!"

A faraway cry answered him. "Here I am, Bill. Here, with

Davisson. We're all right. How about you?"

He saw the two heads about three hundred feet to his left. Relieved, Kenlon shouted: "O. K.!"

There were tears in his eyes, as he turned once more to the nearby head. Anxiously, he recognized the strained profile of the man.

"Black," he said anxiously, "are you all right?"

The man turned dazedly. "Yes, sir," he muttered.

Kenlon swam closer. "Are you sure?"

"Yes, sir." Then more wildly. "But my buddy. Johnston, sir! I haven't seen him."

"Johnston!" Kenlon bellowed the words over the water. He twisted, standing up as high as he could, shouted the name again.

There was no answer from that wide and restless sea. Tedders and Davisson were swimming closer. But there was no sign of Johnston.

Thinking back to the agony and the colossal surprise, the miracle was that any of them had survived. He thought four out of five alive! Men were surely strong and wonderful, terrible in their will to live.

But—where was the *Sea Serpent?*

He wasn't really worried, he told himself shakily. That immense and roaring sound he had heard *must* have been the sub breaking surface. They must have started letting water into the tanks and so she had sunk again. Any second now she would—

There was a long flash of foam in the water two hundred yards seaward. Then a periscope broke surface—the *Sea Serpent* swam into size.

As soon as her deck was clear of water, she began to slow. In a few minutes she was riding lightly. Lieutenant commander Jones-Gordon was the first to appear. He was followed quickly by half a dozen crew members.

A minute later, Kenlon was being dragged aboard. He reported the loss of Johnston; then, having received permission, went below, and changed his clothes.

As he emerged from the hatch, dryly clothed and with hot coffee warming his insides, he was seen by Jones-Gordon. The commanding officer beckoned him, and said:

"Bill, where are we? What happened?"

It was, Kenlon realized grimly, a sixty-four *hundred* dollar problem.

He studied the shore through his glasses, and spent minutes on end peering out over the drab land.

It was an unwholesome vista that unrolled itself as the *Sea Serpent* held to a course parallel to the low-lying beach. The splotches of green showed themselves as nothing but seaweed; and, after an hour, the scene had not changed. After four hours the shore began to fall away sharply from their course.

It was impossible to be sure whether it was a bay or a permanent direction shift of the shore line. Kenlon, who had gone to his

quarters for a short sleep, climbed up again, and watched as the *Sea Serpent* slowed till it was barely creeping along. He turned as Jones-Gordon joined him. The lieutenant commander said:

"I think we'd better lie to, and give our prisoner a going over. I was waiting for you to wake-up before interviewing him."

On the way down, Jones-Gordon added frowningly: "I don't know just what attitude to take towards him. His action is responsible for the death of Johnston; and yet, when you went on deck just before the crisis, he dived over our heads —and prevented us for the necessary few minutes from following you. That precaution on his part undoubtedly saved many lives.

"Similarly," he went on in his precise voice, "in your first struggle with him, he could have knocked you into the sea. Instead, he swept you *up* and back onto the deck."

"Is it possible," the commander concluded, "we should assume that his intentions towards us as individuals are not murderous?"

The questions were not of the kind that Kenlon felt qualified to answer; and, besides, knowing his superior, he had an idea that the queries were purely rhetorical. He tried for a moment to picture the other's intensely practical brain tackling the problem of the winged man and attendant phenomena.

It was a strangely hard picture to evoke. He gave it up, conscious however that it was not an enviable position for such a man to be in.

They found the winged man industriously sketching in Kenlon's notebook.

"He slept for a while," the guard reported. "When he woke up, he kept pointing to the notebook, so I finally let him have it, sir."

"You did quite right," said the commander. "Just step back now, and keep a sharp watch on us while we're with him."

Kenlon saw, with a thrill of excitement, that the birdman was beckoning them. It was a strange sensation to step close to that alien form, and bend with—it—over the notebook.

The feeling faded. The notebook and the drawings in it grasped all his attention.

The first page showed an unmistakable sketch of Sol and its first three planets.

The winged man pointed at Earth, then indicated Kenlon and Jones-Gordon with a slender finger. He pointed at Earth again, and this time indicated himself.

Kenlon said after a silence: "I think he's trying to say, sir, that he is of Earth origin like ourselves."

Jones-Gordon frowned irritably: "Of course he's of Earth. Where else would he be from?"

It struck Kenlon with a pang that this was the flaw he had analyzed in Jones-Gordon, without previously being able to put his mental finger on it.

Abruptly, the skipper's earlier statement that, if he hadn't seen the winged man himself, he wouldn't have believed in him, acquired a new significance. Having seen the impossible, he had accepted it as

fact. He had thus given the partial illusion of being cognizant of all the implications of the fantastic being who had come into their ken.

He wasn't. His imagination was incapable of grasping the wilder possibilities, the utter normal improbability of such a winged man appearing out of nowhere in 1944.

Disappointed, and vaguely disturbed by the unpleasant potentialities, Kenlon did the only logical thing: He held his silence.

"What the devil," said Jones-Gordon, "is this?"

Kenlon emerged from his reverie. His gaze fastened below the drawing of the solar system to a group of figures to which the winged man was pointing:

The creature man seemed to realize that he had their attention again, for he pointed at the lone symbol on the top line, then indicated Earth above it, and began slowly to move his finger around the Sun. One, two, three—nine times he made the circuit, and then pointed again at the solitary symbol in the first line of the figures.

Jones-Gordon said curiously: "Is he trying to say that it represents nine years?"

Kenlon said steadily: "I think so, sir."

"Funny way of figuring, if you ask me," the lieutenant commander grunted. "Why doesn't he make it ten, and simplify the whole problem. What is he doing now?"

The winged man was pointing at the top symbol again. He tapped it with his finger as if he was counting. Kenlon counted with him. one, two, three—eleven. Then the creature man pointed at line two.

"I get it," said Kenlon. "Eleven times nine is ninety-nine. The two symbols stand for ninety-nine years."

A quaver of pure excitement ran through him. He motioned at the third line.

"If the first two groups are 9 and 99, then the third one must be 11 times 99 or 1089, and so on until—"

He stopped, for the winged man was pointing again at the first figure. He began to tap with his finger. It took a long time this time. A minute passed; and still Kenlon counted on, following the tapping of the finger . . . 90 . . . 100, 101, 102 . . . 111.

The counting ended on 111. Once more the birdman indicated the single symbol, then pointed at the third line.

"111 times 9," Kenlon said aloud, "equal 999. Which must mean that the fourth line is 1111 times 9 or 9999 years, and so on till the bottom line comes to 999,999 years. It is an odd way of figuring, but it must have some sound mathematical principle behind it."

He intended to add a comment, but the winged man was rotating his finger rapidly around and around the Sun. Finally he pointed at the bottom line of figures, then at himself.

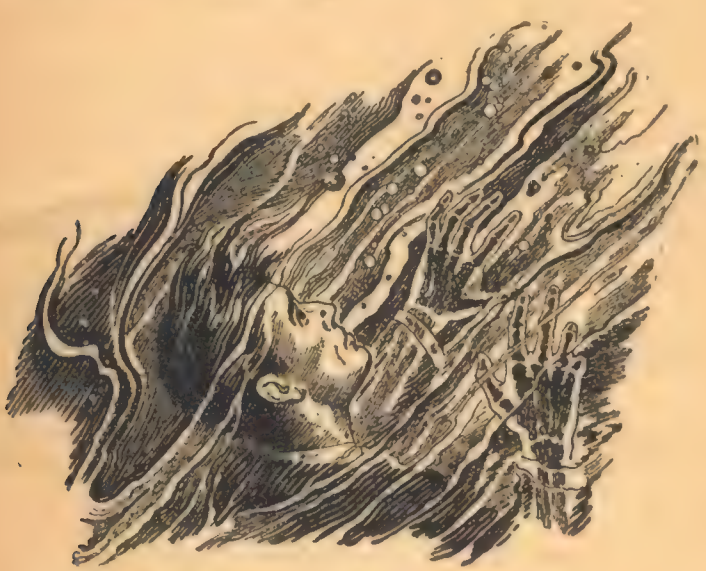
Kenlon's brain reeled. What was he saying? *What* was he trying to say?

"A million years," he heard his own voice muttering flatly. "I think he's trying to tell us that we've been brought about a million years into the future."

After a dazed moment, Kenlon saw that there was an exasperated look on Jones-Gordon's face. The lieutenant commander made an irritating gesture with his body.

"It's evident," he shrugged, "that we're getting nowhere in this attempt at communication. What's on the next page?"

Kenlon turned to it without a word. The sheet revealed a sketch of a submarine heading for an object floating in the sky above the sea. He stared at it, puzzled. After an even blanker moment, he decided it was a mountain rising up out of the sea.



The only thing was that it was definitely drawn as being above the sea, unattached in any way.

Kenlon decided to ignore that. He concentrated on the mountain. It rose sheer on every visible side; and the crown was capped by an enormous building. Dozens of winged men were flying around the massive structure. Others were standing in openings carved high in the towering building. Still

others were hovering just above the water, fighting something that was trying to come up from the sea.

It was strange, that sense of them fighting something. But it was unmistakable. Yet there seemed only to be men in the water.

With a deliberate effort, Kenlon drew his mind from the examination. He caught the keen, hawklike eyes of the winged man, pointed at the mountain, then indicated various directions. He hoped that there would be no question about what he was asking.

There wasn't. The sharp face grew excited, smiling, eager. A wing fluttered, and half pointed with one arm away from the land and from the course the *Sea Serpent* had been pursuing.

Jones-Gordon's voice broke the silence. "Now that," he said, "is impossible. How can he tell from inside the boat here what direction we should follow? He can't possibly know whether or not we changed course while he was sleeping."

Kenlon hesitated. It struck him that his own imagination might be considered irresponsible for the way he had jumped at conclusion after conclusion on the basis of flimsy evidence. A suggestion that the winged man's sense of direction was possibly related to the instincts of a homing pigeon might be the straw that would break the camel's back.

Nevertheless, he had always felt that an officer should express his opinions when asked. That should apply particularly under unusual circumstances.

Still he hesitated. And finally it seemed to him that Lieutenant commander Jones-Gordon's mind had been strained enough for the moment. He grew aware that the skipper was speaking:

"You're the linguist in our outfit, lieutenant. I want you in your spare time to learn his language and teach him ours. But first—come on deck."

Kenlon followed reluctantly. His whole being palpitated with the desire to begin established communication. But he waited quietly, as Jones-Gordon stood for several minutes staring at the shore. The man said abruptly:

"We can't go blindly on along this strange shore in shallow and unknown waters. Besides, we must think of our oil.

"Since the clouds haven't cleared for a moment, it's impossible to tell what time of day it is; so I've decided that we'll stay here overnight and"—he turned to Kenlon, finished briskly—"in the morning you will head an expedition into the interior, remaining several days if necessary, but try to find out everything possible."

Kenlon began to feel excited. It wasn't the shore of itself. Gray and flat it spread before him, nearer and nearer as the motorboat sputtered towards it.

He could see inland about a mile. Beyond that the gray of the sky and the gray of the land blurred further vision.

It didn't matter. In an hour they would have penetrated out of sight of the sea, unless this was a long narrow island, in which event the water would be there on the other side, restlessly awaiting them.

Jones-Gordon had offered the theory that it was an island, adding with an uneasy attempt at logic:

"The Pacific is probably the only body of water that has never been thoroughly explored. There are possibly scores of small atolls that have never been recorded on any map."

Kenlon had pricked that little bubble brutally:

"We followed the shore of this *small,* undiscovered island for four hours at twenty-four knots. And just how did we get opposite it so suddenly and from night into day?"

The instant he had spoken he regretted it; there was no point in fighting a man's basic character. Nevertheless, for a moment his irritation at an intelligent human being who reacted to a winged man much as he would have acted if he had seen an ordinary South Sea native under similar provocative conditions, was—well, infuriating.

Out of the corner of his eyes, Kenlon saw one of Gainishaw's hands leave the wheel, and reach towards him.

"Mr. Kenlon," the helmsman gasped. "What's that over there? Looks like a man swimming. He's watching us."

"Huh!" said Kenlon.

His mind leaped to thought of Johnston. He jumped to his feet with a low cry.

One look verified that it wasn't Johnston. It was—

Kenlon blinked incredulously, and stared at the largest human being he had ever seen. The man was plainly visible not more than a hundred feet away, almost directly in the path of the motorboat. He was at least eight feet in length, and he had very big eyes. He was swimming towards the left parallel to the shore with an easy overhand motion that would have put Weissmueller to shame. He was naked.

His speed was even greater than it seemed. In following him, the motorboat had to turn at full right angles to its course. Just before they drew up to him, the swimmer whirled in the water like an animal at bay.

It was a strong, beefy but intelligent countenance that faced up to them. The man's ears, Kenlon observed, were very flat against his head; his nose was small, almost stubby and, upturned as it was, revealed the barest suggestion of nostrils. The mouth, however, was normal with sturdy white teeth.

The swimmer's large eyes stared at the boat and its occupants with a keen, absorbed appraisal, but utterly without fear.

"Careful!" Kenlon cautioned. "Steer clear of him. Don't let him grab the gunwale. *Watch out!*"

But the boat had slowed too much. Its propeller reversed, it was not maneuverable. Before the forward impulse could be resumed, before the motor could even speed up, the strange giant had lunged

towards the boat. Thick fingers clutched the gunwale—and he was aboard.

It was the fastest, strongest movement Kenlon had ever seen. With a hiss of indrawn breath, he snatched his gun from its holster; and then, seeing that the monster was making no threatening movement, held his fire.

The motorboat ceased its wild swaying; and Kenlon saw that only one man had succeeded in getting his rifle into firing position. Kenlon yelled warningly:

"Hold your fire, Pannatt."

The stranger had been standing with back towards Kenlon. At the sound of Kenlon's voice, he half turned; then he seemed to think better of it. He stepped forward, towards Gainishaw at the wheel. And once more changed his mind.

Like a streak, he turned, and snatched the gun from Pannatt's fingers. The very instant he had the gun, his manner changed again. An unmistakable aura of curiosity exuded from the very attitude of his body.

It was so clear, so completely lacking in hostility, that Kenlon, on the verge of pressing the trigger, relaxed his finger, and waited.

He was astounded. He felt himself in the presence of a man who was his superior in every way; a man so quick mentally and physically, that actions which would have resulted in the death of ordinary men, left him untouched, not even threatened.

It was all too swift. The vagrant thought came to Kenlon: Should he capture the man? Before he could even think about it, the giant had solved the mechanism of the Garand.

He fired the gun into the water; and then, as if instantly realizing all its implications, assumed an attitude of contempt. Without a word, exuding derision, he handed the weapon back to Pannatt. Then he was at the wheel.

He seemed to know where the engine would be; or perhaps he had noted that before. Up came the doors; and he was bending over the motor, curious, absorbed, intent. For a moment, Kenlon saw only the massive legs, the more massive buttocks.

The moment gave him time to think: "Grab him!" he said softly. And dived forward.

He was not roughly handled. The giant twisted about, and caught him with a strength that brooked no resistance—and held him up for one of those lightning examinations.

For the first time, Kenlon saw the creature's front. It was such a fleeting glance that he had only time to notice that the other seemed to be wearing something frilly on his dark-brown chest, partly under the great arms.

The next instant he had been set down; and there was a splash. Kenlon stood dumb and useless trying to force his mind to think of what he had seen.

Not gills, he thought madly; it couldn't have been gills.

There was no way of verifying.

Though they waited ten minutes, the human fish did not reappear.

He decided against returning to the ship. The episode must have been observed; and he could send a brief report back to the skipper with Gainishaw.

After he had scrawled his account, he decided to put the affair out of his mind. Later, he would think it over.

The thought did come that *this* was what the birdmen must have been fighting in the water at the foot of their mountain eyrie.

He turned his attention to the shore, which was very near now. He said to Gainishaw:

"Careful! I imagine there's a very gradual falling off of land into water. Let's see how far we can go."

Surprisingly, they made it to within fifteen feet of shore before the nose of the motorboat sank gently into a black ooze.

Kenlon said: "O. K., I guess we'll have to walk. Rifer, Smiley, Glabe, Ridell, Pannatt—your packs and your guns! Let's go!"

Two of the men jumped for shallow water. Kenlon lowered himself over the side with some attempt at dignity.

His feet touched the mud, and kept right on going. He saw with a blank horror the two men who had jumped sink like stones into a bottomless mud. Two appalled screams rent the air, then a horrid gurgling—and silence except for the mutter of the throttled motor.

He was struggling, fighting. The weight of his pack—fifty pounds—helped the clutching mud. But his fingers were still holding onto the gunwale. And they didn't let go.

He drew himself up. The boat rocked; and there was a sound of other men panting and wheezing with effort; and then one of Gainishaw's hands closed over his right wrist, and the other caught the scruff of his shirt.

The mud released him with a faint squitch. He splashed with his feet. Then he fell into the bottom of the boat. For a moment he lay there, empty minded; and then as his consciousness poured back into his head, he scrambled to his knees in time to give Smiley a hand up while Gainishaw pulled Glabe and Ridell into the boat.

While the rescued men drooped with exhaustion, Kenlon snatched a canvas from the tool chest, and tossed it onto the shore opposite them. He whirled.

"Back to the ship!" he commanded. "Top speed. We've got to make some attempt to rescue Pannatt and Rifer."

He pictured the two men, held in suspension beneath the mud, their lungs full of water they had swallowed before the mud sucked them under.

For the next half hour, they might still be rescuable—

Jones-Gordon came back with them. In a rubber dinghy, then, sweating men hovered over the mud with hooked sticks, and probed for bodies.

After three minutes they pulled

up Rifer, a gray limp mass. The skipper and Kenlon worked over him alternatively, then sent him back to the *Sea Serpent*. Jones-Gordon went aboard to carry on with the resuscitation; Kenlon returned to where the dinghy was dragging the mud.

In about fifteen minutes the signal was flashed from the conning tower that Rifer had come to. Briefly, that enlivened the search. But after an hour there was still no sign of Pannatt.

Kenlon remembered the man, a wiry little Iowan, with cheerful gray eyes, and a habit of doing everything on the double. Not married! Which was something. One of the nightmares of the service was composing letters to the widows of the deceased.

But marriage wasn't everything. There was something inexpressibly tragic about a man who had no home, no friends except a few shipmates like himself, such a man going into the oblivion of a bottomless world of mud.

Terrible that there were so many men on these ships whom no one would remember beyond a few days. Kenlon grew aware that Gainishaw was trying to attract his attention.

"The skipper, sir, is signaling for the motorboat to return."

"Very well," Kenlon nodded.

There was no doubt that it was time to call off the search, but the prospect depressed him. To his surprise Jones-Gordon climbed in with him, and they returned to the scene of the disaster.

The lieutenant commander explained: "The men wouldn't like it if I did not personally supervise the final steps. Even if we found Pannatt now, we could only give him a sea burial. You agree with that, do you not?"

Kenlon agreed; and the other man went on:

"What do you make of this mud, Bill?"

Kenlon shook his head. "I never saw anything like it, sir. The particles are so fine that they won't even form a crust." He motioned towards the land. "All the top layer is dry. It looks hard, and yet there is not even an attempt among the individual particles to cling together, and form a cohesive mud pack. Perhaps, we should test it farther along the shore. It seems incredible there isn't any dry land at all."

Jones-Gordon scowled decisively. "Put me back on the *Sea Serpent* with half the men and the dinghy, and make the tests," he commanded.

In spite of the earlier words, Kenlon felt a shock. "Rescue operations suspended?" he asked.

The skipper nodded. "Suspended."

It was one thing to cease physical operations, quite another to suspend them mentally. As they pushed cautiously along the shore, probing that deceiving and murderous land, Kenlon kept seeing the man sinking, sinking, down and down into the depths of an eight-thousand-mile in diameter ball of mud.

He thought: What was the mat-

ter with him? After all he had seen death before.

It must be the manner of the death—and the setting.

The setting! His mind shook. Was it possible they were actually 999,999 years into the future? And *this* gray horror was the destiny of the continents?

His mind reverted to thought of the swimming giant and the winged man. After a moment it was clear that, for the *Sea Serpent* and its officers and men, what had happened was but the beginning.

There seemed no possible satisfactory ending.

Kenlon found it a hard language to learn; and the birdman had the same difficulty with English. Ordinary words like hand, foot, wing, when the creature pronounced them, were almost incomprehensible. And Kenlon's efforts to imitate the melodic sounds of the winged man only made his tutor shake his head sadly.

So far as Kenlon could make out, the creature pronounced *r* like *a* in father, except that the sound contained the barest hint of the consonant hardness. A similar difficulty obtained with fully half of the other letters.

Kenlon saw, however, that their anxiety, their sense of urgency was about equal; and, by the end of the fourth week, they could write each other's languages with fair ease, though speech remained a laborious process.

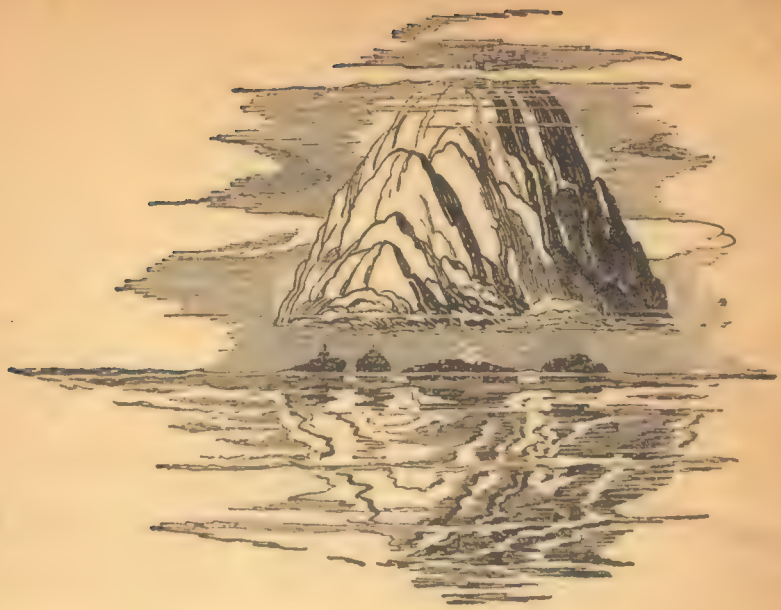
On the thirty-first day, he felt sure enough of himself to bring Jones-Gordon down to interview the prisoner. For a whole week, he had been jotting down questions on the basis of the flimsy vocabulary he had picked up from the birdman, and influenced by the messages the creature had persistently tried to put over, both in his speaking and his writing.

He had divided the questions into two sections. He handed over the first section, and then sat watching the strained face of the birdman, while the man wrote, as they had agreed, the answer to each question first in English, then in, well, whatever it was.

After four weeks, Kenlon thought as he waited. For a whole month, the *Sea Serpent* had lain motionless in a choppy gray sea under a perpetually clouded sky a mile from a terrible land that wasn't land at all.

It was a ship of badly frightened, bewildered men. Funny that fright. Men who, when a Jap merchantman went down, had grinned in spite of the knowledge that at any moment depth bombs would start exploding, now looked haunted and fearful in the face of a danger of unplumbed dimensions.

And there was nothing they could do, nothing that could be done for them. Jones-Gordon the practical had lost ten pounds; and the reality must have sunk deep indeed into him because not once during the entire month did the Diesels turn over. The *Sea Serpent*, though heavy with oil, wasted not a drop



of fuel on excursions that the skipper apparently realized in his heart would be futile.

Especially significant of the change that time had wrought was that Jones-Gordon had read Kenlon's proposed questions, and O. K.'d them without comment.

They sat and waited. Kenlon caught himself surreptitiously watching, not the winged man, but Lieutenant commander Jones-Gordon. The commander's face was impassive, though there were vaguely anxious lines around his eyes.

Sitting there, studying that rather heavy, strong but unimaginative, earnest, brave countenance, Kenlon had the sudden conviction that, no matter what mental concessions the other was prepared to make to reality, the situation would still always be too big for him.

Not, Kenlon thought wryly, that he himself was equipped, except for his curious *willingness* to adapt himself, to handle what was here.

The birdman's voice trilled across Kenlon's reverie: "Heaa you aaa."

Jones-Gordon jumped. Kenlon made no effort to take the notebook extended by the winged man, but silently indicated the skipper. Rather reluctantly, the winged man handed it over.

The lieutenant commander began to read. It didn't take long. When he had finished, he sat for a while seemingly lost in thought. Ab-

ruptly, he handed the note sheet to Kenlon, who read:

Q. Is this Earth?
A. Yes.
Q. Is it Earth of the future?
A. Yes.
Q. How far future?
A. 994,999 years—approximately.
Q. Are we in the same ocean?
A. Yes, but a different part.
Q. How many oceans are there on Earth now?
A. Three big lands. The rest is ocean.
Q. How many lands?
A. See above.
Q. Why is the land so soft?
A. Water fell from space for 999 years. The water from space had something in it which prevents—I could name this in my own language—soil from sticking together.
Q. Where did so much water come from?
A. See above.
Q. Is there any hard land?
A. Only our island in the sky.
Q. What is your name?
A. Nemmo.

Kenlon did not look up immediately. None of the answers given were new to him. The question was: Should he discuss them as if they were, or quite frankly act as if he had known for some time.

Until this instant he had thought that the moment would decide the problem. Now that the moment was here, the decision still rested squarely with him.

He sighed. Still undecided, he handed the rest of the questions, all of them, to Nemmo, waited until the winged man had bent to his labored answering, and then turned to Jones-Gordon, and said cautiously:

"I gathered some of this stuff from what—Nemmo—has written to me from time to time in doing his exercises in English. My questions, as you can see by their pointedness were partly based on that advance knowledge."

He paused, giving his chief time to say something, if he intended to. The pause was also designed to give himself further chance to decide on how far he should admit familiarity with the facts, now that he had started as he had. No comment came from the skipper; and after a minute Kenlon went on swiftly but carefully:

"There's not much can be said. The answers either speak for themselves, or we're all mad. One curious fact is the number system. Instead of saying approximately 995,000 years, Nemmo says 994,999. It looks awkward, but it is already apparent that winged men use nine as we use zero.

"In its way, that is a devastatingly convincing point. It's strange, genuinely alien in concept, and yet oddly logical. Nine, if you think about it, is almost as wonderful a number as ten. Perhaps *they* found it more so. Perhaps they have discovered mathematical uses for it, of which we have no knowledge.

"I'm not going to press this point. At the moment, all I know about the number nine is that it

can be used to verify the answers of problems in addition, subtraction, multiplication and division."

Once more Kenlon paused. This time he stole a look at the skipper. The lieutenant commander was sitting stiffly, his eyes staring fixedly straight ahead. After a moment, there seemed nothing to do but speak further. Kenlon did so reluctantly:

"You will notice the reference to water from space. I doubt if there's a 1944 astronomer who could explain that in detail; the fact, however, explains why we arrived in this time period in such a depth of water. My personal impression is that I came up through at least a hundred feet before I broke surface. And now, as to his statement that the home of the flying men actually floats in the sky above the sea—"

Jones-Gordon stirred. His face muscles rippled, enlivening his whole face. He said drably:

"I think, Mr. Kenlon, we had better see the rest of the answers before we go any deeper into interpretations."

It was as bluntly worded an invitation to silence as Kenlon had ever received from Jones-Gordon. He did not let it worry him.

What was disturbing was the evidence it gave of the lieutenant commander's intellectual state of mind. His words left no doubt at all that the practical brain was rocking on its foundations.

There was silence among the three of them, until the winged man looked up: "Filished!" he said, and handed the skipper the question-and-answer sheets. Jones-Gordon read them, then passed them on to Kenlon.

Q. Are there more winged men?
A. 239,999 approximately.
Q. Where do they live?
A. On our metal island in the sky.
Q. What are they called?
A. Men.
Q. How can we get to them?
A. I will point the way. I want you and the ship to go there.
Q. How did your people learn to fly?
A. We were made. Men of the ground like yourself saw the water come through space. There was nowhere to escape to. So they made some men for flying, and some for swimming. They were wonderful, these groundmen. They knew everything. But they are all dead now. A great tragedy.
Q. Why do you weigh so little?
A. My bones are hollow; my flesh very light and strong. I have been eating your foods sparingly, because they are too heavy. There are extra lungs inside my bones.
Q. Are there other men on Earth?
A. Some were made by the groundmen for swimming. These men are our enemies. They live in a metal island under water. They hate us, and intend to destroy us all. We brought you here to blow up their city under the sea.
Q. Why did you bring us here?
A. You must destroy the metal city of the fishmen.

Q. Can you put us back to our time?

A. We will put you back when you have destroyed the city of our enemy.

The Diesels began their steady chatter. The-three-hundred-fifty-foot steel machine ceased its rolling, turned slowly onto its new course, and began to pick up speed. In half an hour, the flat, gray land was completely merged with the gray waters and the gray sky.

Kenlon turned, as Jones-Gordon joined him at the railing. The lieutenant commander said:

"I thought you might like to know my reasons for setting our course for this eyrie of the winged men, if there is such a place."

Kenlon nodded, but said nothing. The skipper stood frowning for a moment, then resumed abruptly:

"First of all, if this fantastic place of theirs is actually floating in the sky somewhere ahead, its existence will provide verification for the rest of the story."

Kenlon nodded again, again said nothing. The thought came to him, however, that an intelligent man who needed further evidence that they were not in 1944 wherever else they might be, was a—he couldn't decide exactly what.

It was possible, of course, that so unimaginative a human being, a man whose mind was solidly attached to the realities he knew, might be very useful in keeping them all down to earth in a stabilizing sense of the phrase.

Might! Kenlon's brow crinkled ever so slightly. There were other potentialities that were not so attractive.

"The second reason," Jones-Gordon went on, "why it is desirable to visit the island is because *there* will be located the time machine responsible for bringing the *Sea Serpent* to *this*."

He waved his hand at the now limitless ocean, and made a wry face.

"Thirdly," he continued coolly, "the fact that they have found it necessary to search through time for a war machine that will serve their purpose of underwater destruction suggests that this submarine is the greatest weapon now existing in the year of 995,943 A. D."

Jones-Gordon looked sharply at Kenlon. "Do you agree with that?"

Kenlon hesitated. It was a good point; he had to admit that. He said slowly:

"At least, their defenses are good. A three-pound shell didn't even dent the metal used in the construction of their electronic time tube. Of course Nemmo told me one day, when I was haltingly questioning him about the tube, that the groundmen used a uniformly thick metal in all their general purpose work. I venture to say that, strong as it is, it couldn't begin to stand up against one of our torpedoes."

Jones-Gordon was nodding with savage satisfaction. "We have aboard, Mr. Kenlon, forty-eight of the mightiest explosive weapons of

our age. I think we can dominate any situation."

Kenlon shook his head. "People who can build a time machine, sir, are not to be discounted. To my mind, the weakness of these birdmen is not intelligence, but materials. They probably have no mining facilities, nothing but their home.

"I suggest that the same limitation has not applied to the fishmen, which is why they are dangerous to the birdmen. I cannot emphasize too strongly that the specimen we saw was superhuman in every sense of the word. He was—"

Kenlon paused, amazed at the awe that abruptly affected his voice, and flowed like fire through his body. He shook himself, finished rather weakly:

"The winged men lack the equipment to reach the fishmen, but the reverse situation does not obtain."

There was no immediate answer. Jones-Gordon stood staring out to sea, his heavy face almost expressionless. Kenlon recognized the fatalistic look that finally came into the lieutenant commander's eyes. The officer said in a curiously quiet voice:

"If our situation is as this creature described, then we are, so far as the United States Navy is concerned, an expended unit. By that statement you will see that I take no stock in their promise to return us to 1944 when we have accomplished this ridiculous purpose of theirs. I think we are justified in assuming that we are lost men, and are, therefore, free of all constraint and all the petty alarms of men who still retain hope."

He stopped; and Kenlon sighed inwardly. Like all human beings, Jones-Gordon could not be docketted into one pigeonhole. Practical he might be, but in this mood his character changed almost literally. Somehow, long ago, the lieutenant commander had resigned himself to death. It had made him utterly fearless, cool and unexcitable in battle, the perfect commander.

It was theoretically possible that all the men who went down to the sea in submarines should similarly surrender themselves to a destiny with death. But they hadn't. Kenlon hadn't. In battle, his nerves tensed to violin-string tautness; his mind was as cold as the metal plates of the sub in which he served; his calmness the artificial calm of the trained man who has a job to do, and does it.

But he feared death. Sometimes at night he would wake up sweating from a dream in which they had been sunk, and the water was pouring in with a hellishly final violence.

He said now: "Then you have no intention of doing as the winged men desire?"

The answer was cool, and devastating in its logic:

"The United States Navy does not engage in private wars, regardless of inducement. It obeys orders and defends itself when attacked.

"There is only one group here

that can be said to have attacked us. We—"

There was a shout: "Land ho! Straight ahead, sir."

One glance was all Kenlon needed. They had come to the island in the sky.

The naked eye showed a vague shape rising up apparently out of the sea, its upper reaches lost in the clouds above. It was not until he looked through his glass that Kenlon realized that the—mountain—was at least fifty, possibly seventy-five miles away.

Its shape was roughly as Nemmo had drawn it that first day, except that the walls did not seem quite so sheer, were, in fact, distinctly triangular, angled up to provide a base for the building, which was still almost completely buried in the perpetual nimbostratus clouds.

Far ahead of the sub, it began to rain. The mountain was blotted out. When the rain ended after more than an hour, Kenlon shed his oils, and watched as the eyrie of the winged men once more showed through the mist.

It was still in the distance, but the rift between its base and the sea was plainly visible at last through his glass. He could make out too, more clearly now, the building that crowned the dark mountain.

Nothing else. Distance hid whatever signs of life were manifesting on the enormous black triangle of sky island. The deadness, the alienness, the *impossibility* of what he was seeing enormously intensified the anxiety that had been gathering in Kenlon.

It was time, he thought grimly, that he forget his semi-friendliness towards the winged men, product of his month's close association with the quiet and gentle Nemmo, and remember that a United States submarine had been brought forcibly into a strange world on an "or else" basis.

What was needed here was the cold objectivity and devotion to duty of a Jones-Gordon, and no weakness at all; none! And yet—

Undecided, he raised his glass again, examining the base of the mountain. From his low vantage point, it was impossible to see the water underneath, but there were several shapes there that seemed to be lying in the water, one of them a torpedolike structure, so long and sinister looking that Kenlon felt a chill along his spine.

He hesitated. The lieutenant commander was sleeping; and on this as on all submarines, the command centered so peculiarly around the skipper that Kenlon had long since formed the habit of leaving all basic decisions to Jones-Gordon.

He shook himself. They were in deadly water; and that was reason enough to prepare the ship. He called sharply:

"You men down there on deck—get below."

They came, scrambling. Kenlon phoned the diving officer:

"Mr. Gagnon, open the Kingston valves in the fore and aft main ballast tanks."

"Open the Kingston valves fore and aft. Aye, aye, sir."

There was a swirling sound as water rushed into the tanks. The *Sea Serpent* settled perceptibly, and slowed as her decks were washed by a rising sea. The water lashed up to the base of the conning tower, then rose no more.

The sound of the water pouring into the tanks yielded to the pressure of the air that was still in the tanks, and ceased. Riding on her vents, rigged for diving within seconds, the *Sea Serpent* slid on through the gray ocean.

The readjustment had barely been completed when Jones-Gordon climbed onto the bridge.

"I was hoping, sir," Kenlon greeted him, "you wouldn't be awakened by the sound of the water. It was a precaution only."

He explained about the objects in the water below the eyrie, finished:

"They're harder to see now that we're running awash, but they're still visible."

For a long minute Jones-Gordon stood staring through his glass. He turned finally:

"Go below and ask our prisoner what they could be."

Nemmo frowned over Kenlon's written question. His wings fluttered abruptly in a way that Kenlon had observed in the past indicated excitement. He wrote:

"Others like myself were sent into various periods of time. Apparently some of these were successful in bringing back warcraft from ages later than your own. There is no historical record however of submarines being used after the twentieth century except for undersea exploration. And only a submarine, it seems to me, could be successful against the city of the swimming men."

"Oh!" said Kenlon, as he finished reading.

An hour later, as they hove-to within a mile of the torpedo-shaped ship, Kenlon studied the alien. It was not less than a thousand feet in length, and it was all metal. There were other, smaller craft lying on the water; and Kenlon, facing port, was anxiously scanning these through his glass when he heard a faint splash and, turning, saw the two giants.

"Watch out, sir!" he yelled.

He snatched his gun, and leaped towards Jones-Gordon. He was too late; incredibly, he was too late. Before the lieutenant commander could jerk away from the railing, great hands had him; he was lifted, actually torn from his position; so swift it all was.

A monstrous splash, the gurgling of a man drowning, and a horrid trail of bubbles. Kenlon saw the three bodies briefly twenty feet beneath the surface; and then there was a flick of flesh color; and they were gone into the depths.

Not until then, when it was already immeasurably too late, did he fire his gun.

The four shots and accompanying splashes echoed futilely on the humid air.

TO BE CONCLUDED.

The Yehudi Principle

by FREDRIC BROWN

Maybe it was the Man Who Wasn't There, and maybe it was the subconscious and super-speed that obeyed the mental orders and wrote the story. But who got shot on the stairs?

Illustrated by Alfred

I am going crazy.

Charlie Swann is going crazy, too. Maybe more than I am, because it was his dingbat. I mean, he made it and he thought he knew what it was and how it worked.

You see, Charlie was just kidding me when he told me it worked on the Yehudi principle. Or he thought he was.

"The Yehudi principle?" I said.

"The Yehudi principle," he re-

peated. "The principle of the little man who wasn't there. He does it."

"Does what?" I wanted to know.

The dingbat, I might interrupt myself to explain, was a headband. It fitted neatly around Charlie's noggin and there was a round black box not much bigger than a pillbox over his forehead. Also there was a round flat copper disk on each side of the band that fitted over each of Charlie's temples, and a strand of wire that ran down behind his ear into the breast pocket of his coat, where there was a little dry-cell battery.

It didn't look like it would do anything, except maybe either cure a headache or make it worse. But from the excited look on Charlie's face, I didn't think it was anything so commonplace as that.

"Does what?" I wanted to know.

"Whatever you want," said Charlie. "Within reason, of course. Not like moving a building or bringing you a locomotive. But any little thing you want done, he does it."

"Who does?"

"Yehudi."

I closed my eyes and counted to five, by ones. I *wasn't* going to ask "Who's Yehudi?"

I shoved aside a pile of papers on the bed—I'd been going through some old clunker manuscripts seeing if I could find something good enough to rewrite from a new angle—and sat down.

"O. K.," I said. "Tell him to bring me a drink."

"What kind?"

I looked at Charlie, and he didn't look like he was kidding. He had to be, of course, but—

"Gin buck," I told him. "A gin buck, with gin in it, if Yehudi knows what I mean."

"Hold out your hand," Charlie said.

I held out my hand. Charlie, not talking to me, said, "Bring Hank a gin buck, strong." And then he nodded his head.

Something happened either to Charlie or to my eyes, I didn't know which. For just a second, he got sort of misty. And then he looked normal again.

And I let out a kind of a yip and pulled my hand back, because my hand was wet with something cold. And there was a splashing noise and a wet puddle on the carpet right at my feet. Right under where my hand had been.

Charlie said, "You should have asked for it in a glass."

I looked at Charlie and then I looked at the puddle on the floor and then I looked at my hand. I stuck my index finger gingerly into my mouth and tasted.

Gin buck. With gin in it. I looked at Charlie again.

He asked, "Did I blur?"

"Listen, Charlie," I said, "I've known you for ten years, and we went to Tech together and— But you pull another gag like that, and I'll blur you, all right. I'll—"

"Watch closer this time," Charlie said. And again, looking off into space and not talking to me at all, he started talking. "Bring us a fifth of gin, in a bottle. Half a dozen lemons, sliced, on a plate.

Two quart bottles of soda and a dish of ice cubes. Put it all on the table over there."

He nodded his head, just like he had before, and darned if he didn't blur. *Blur* was the best word for it.

"You blurred," I said. I was getting a slight headache.

"I thought so," he said. "But I was using a mirror when I tried it alone, and I thought maybe it was my eyes. That's why I came over. You want to mix the drinks or shall I?"

I looked over at the table, and there was all the stuff he'd ordered. I swallowed a couple of times.

"It's real," Charlie said. He was breathing a little hard, with suppressed excitement. "It works, Hank. It *works*. We'll be rich! We can—"

Charlie kept on talking, but I got up slowly and went over to the table. The bottles and lemons and ice were really there. The bottles gurgled when shaken and the ice was cold.

In a minute I was going to find out how they got there. Meanwhile and right now, I needed a drink. I got a couple of glasses out of the medicine cabinet and the bottle opener out of the file cabinet, and I mixed two drinks, about half gin.

Then I thought of something. I asked Charlie, "Does Yehudi want a drink, too?"

Charlie grinned. "Two'll be enough," he told me.

"To start with, maybe," I said grimly. I handed him a drink—in a glass—and said, "To Y-Yehudi." I downed mine at a gulp and started mixing another.

Charlie said, "Me, too. Hey, wait a minute."

"Under present circumstances," I said, "a minute is a minute too long between drinks. In a minute, I shall wait a minute, but— Hey, why don't we let Yehudi mix 'em for us?"

"Just what I was going to suggest. Look, I want to try something. You put this headband on and tell him to. I want to watch you."

"Me?"

"You," he said. "It can't do any harm, and I want to be sure it works for everybody and not just for me. It may be that it's attuned merely to my brain. You try it."

"Me?" I said.

"You," he told me.

He'd taken it off and was holding it out to me, with the little flat dry cell dangling from it at the end of the wire. I took it and looked it over. It didn't look dangerous. There couldn't possibly be enough current in so tiny a battery to do any harm.

I put it on.

"Mix us some drinks," I said, and looked over at the table, but nothing happened.

"You got to nod just as you finish," Charlie said. "There's a little pendulum affair in the box over your forehead that works the switch."

I said, "Mix us two gin bucks. In glasses, please." And nodded.

When my head came up again, there were the drinks, mixed.

"Blow me down," I said. And bent over to pick up my drink.

And there I was on the floor.

Charlie said, "Be careful, Hank. If you lean forward, that's the same as nodding. And don't nod or lean just as you say something you don't mean as an order."

"Fan me with a blowtorch," I said.

But I didn't nod. In fact, I didn't move. When I realized what I'd said, I held my neck so rigid that it hurt, and I didn't quite breathe for fear I'd swing that pendulum.

Very gingerly, so as not to tilt it, I reached up and took off the headband and put it down on the floor.

Then I got up and felt myself all over. There were bruises, but no contusions. I picked up the drink and drank it. It was a good drink, but I mixed the next one myself. With three-quarters gin.

With it in my hand, I circled around the headband, not coming within a yard of it, and sat down on the bed.

"Charlie," I said, "you've *got* something there. I don't know what it is, but what are we waiting for?"

"Meaning?" said Charlie.

"Meaning what any sensible man would mean. If that darned thing brings anything we ask for, well, let's make it a party. Which would you rather have, Hedy Lamarr or Betty Grable? I'll take the other."

He shook his head sadly. "There are limitations, Hank. Maybe I'd better explain."

"Personally," I said, "I would prefer Hedy to an explanation, but go ahead. Let's start with Yehudi. The only two Yehudis I know are Yehudi Menuhin, the violinist, and Yehudi, the little man who wasn't there. Somehow I don't think Menuhin brought us that gin, so—"

"He didn't. For that matter, neither did the little man who wasn't there. I was kidding you, Hank. There isn't any little man who wasn't there."

"Oh," I said. I repeated it slowly, or started to. "There—isn't—any—little—man—who—wasn't—" I gave up. "I think I begin to see," I said. "What you mean is that there wasn't any little man who isn't here. But then, who's Yehudi?"

"There isn't any Yehudi, Hank. But the name, the idea, fitted so well that I called it that for short."

"And what do you call it for long?"

"The automatonic autosuggestive subvibratory superaccelerator."

I drank the rest of my drink.

"Lovely," I said. "I like the Yehudi principle better, though. But there's just one thing. Who brought us that drink-stuff? The gin and the soda and the so forth?"

"I did. And you mixed our second-last, as well as our last drink. Now do you understand?"

"In a word," I said, "not exactly."

Charlie sighed. "A field is set up between the temple-plates which accelerates, several thousand times, the molecular vibration and thereby

the speed of organic matter—the brain, and thereby the body. The command given just before the switch is thrown acts as an auto-suggestion and you carry out the order you've just given yourself. But so rapidly that no one can see you move; just a momentary blur as you move off and come back in practically the same instant. Is that clear?"

"Sure," I told him. "Except for one thing. Who's Yehudi?"

I went to the table and started mixing two more drinks. Seven-eighths gin.

Charlie said patiently, "The action is so rapid that it does not impress itself upon your memory. For some reason the memory is not affected by the acceleration. The *effect*—both to the user and to the observer—is of the spontaneous obedience of a command by . . . well, by the little man who wasn't there."

"Yehudi?"

"Why not?"

"Why not why not?" I asked. "Here, have another drink. It's a bit weak, but so am I. So you got this gin, huh? Where?"

"Probably the nearest tavern. I don't remember."

"Pay for it?"

He pulled out his wallet and opened it. "There's a fin missing. I probably left it in the register. My subconscious must be honest."

"But what good is it?" I demanded. "I don't mean your subconscious, Charlie, I mean the Yehudi principle. You could have just as easy bought that gin on the way here. I could just as easy have mixed a drink and known I was doing it. And if you're *sure* it can't go bring us Hedy Lamarr and Betty Gra—"

"It can't. Look, it can't do anything that you yourself can't do. It isn't an it. It's you. Get that through your head, Hank, and you'll understand."

"But what good is it?"

He sighed again. "The real purpose of it is *not* to run errands for gin and mix drinks. That was just a demonstration. The real purpose—"

"Wait," I said. "Speaking of drinks, wait. It's a long time since I had one."

I made the table, tacking only twice, and this time I didn't bother with the soda. I put a little lemon and an ice cube in each glass of gin.

Charlie tasted his and made a wry face.

I tasted mine. "Sour," I said. "I should have left out the lemon. And we better drink them quick before the ice cubes start to melt or they'll be weak."

"The real purpose," said Charlie, "is—"

"Wait," I said. "You could be wrong, you know. About the limitations. I'm going to put that headband on and tell Yehudi to bring us Hedy and—"

"Don't be a sap, Hank. I made the thing. I know how it works. You can't get Hedy Lamarr or Betty Grable or Brooklyn Bridge."

"You're positive?"

"Of course."

That's what a sap I was. I believed him. I mixed two more drinks, using gin and two glasses this time, and then I sat down on the edge of the bed, which was swaying gently from side to side.

"All right," I said, "I can take it now. What is the real purpose of it?"

Charlie Swann blinked several times and seemed to be having trouble bringing his eyes into focus on me. He asked, "The real purpose of what?"

I enunciated slowly and carefully. "Of the automatonic autosuggestive subvibratory superaccelerator. Yehudi, to me."

"Oh, that," said Charlie.

"That," I said. "What is its real purpose?"

"It's like this. Suppose you got something to do that you've got to do in a hurry. Or something that you've got to do, and don't want to do. You could—"

"Like writing a story?" I asked.

"Like writing a story," he said, "or painting a house, or washing a mess of dishes, or shoveling the sidewalk, or . . . or doing anything else you've got to do but don't want to do. Look, you put it on and tell yourself—"

"Yehudi," I said.

"Tell Yehudi to do it, and it's done. Sure, you do it, but you don't know that you do, so it doesn't hurt. And it gets done quicker."

"You blur," I said.

He held up his glass and looked through it at the electric light. It was empty. The glass, not the electric light.

He said, "You blur."

"Who?"

He didn't answer. He seemed to be swinging, chair and all, in an arc about a yard long. It made me dizzy to look at him, so I closed my eyes, but that was worse so I opened them again.

I said, "A story?"

"Sure."

"I got to write a story," I said. "but why should I? I mean, why not let Yehudi do it?"

I went over and put on the headband. No extraneous remarks this time, I told myself. Stick to the point.

"Write a story," I said.

I nodded. Nothing happened.

But then I remembered that, as far as I was supposed to know, nothing was supposed to happen. I walked over to the typewriter desk and looked.

There was a white sheet and a yellow sheet in the typewriter, with a carbon between them. The page was about half filled with typing and then down at the bottom were two words by themselves. I couldn't read them. I took my glasses off and still I couldn't, so I put them back on and put my face down within inches of the typewriter and concentrated. The words were "The End."

I looked over alongside the typewriter and there was a neat, but small pile of typed sheets, alternate white and yellow.

It was wonderful. I'd written a story. If my subconscious mind had anything on the ball, it might be the best story I'd ever written.

Too bad I wasn't quite in shape to read it. I'd have to see an optometrist about new glasses. Or something.

"Charlie," I said, "I wrote a story."

"When?"

"Just now."

"I didn't see you."

"I blurred," I said. "But you weren't looking."

I was back sitting on the bed. I don't remember getting there.

"Charlie," I said, "it's wonderful!"

"What's wonderful?"

"Everything. Life. Birdies in the trees. Pretzels. A story in less than a second! One second a week I have to work from now on. No more school, no more books, no more teacher's sassy looks! Charlie, it's *won*derful!"

He seemed to wake up. He said, "Hank, you're just *beginning* to see the possibilities. They're almost endless, for any profession. Almost *anything*."

"Except," I said sadly. "Hedy Lamarr and Betty Grable."

"You've got a one-track mind."

"Two-track," I said. "I'd settle for either. Charlie, are you *positive*—"

Wearily, "Yes." Or that was what he meant to say; it came out "Yesh."

"Charlie," I said, "You've been drinking. Care if I *try*?"

"Shoot yourself."

"Huh? Oh, you mean suit yourself. O. K., then I'll—"

"Thass what I shaid," Charlie said. "Suit yourshelf."

"You did not."

"What did I shay, then?"

I said, "You shaid . . . I mean said: 'Shoot yourself.'"

Even Jove nods.

Only Jove doesn't wear a headband like the one I still had on. Or maybe, come to think of it, he does. It would explain a lot of things.

I must have nodded, because there was the sound of a shot.

I let out a yell and jumped up, and Charlie jumped up too. He looked sober.

He said, "Hank, you had that thing on. Are you—?"

I was looking down at myself and there wasn't any blood on the front of my shirt. Nor any pain anywhere. Nor anything.

I quit shaking. I looked at Charlie; he wasn't shot, either.

I said, "But who—? What—?"

"Hank," he said. "That shot wasn't in this room at all. It was

outside, in the hallway, or on the stair."

"On the *stair?*" Something prickled at the back of my mind. What about a stair? *I saw a man upon the stair, a little man who was not there. He was not there again today. Gee, I wish he'd go away—*

"Charlie," I said, *"It was Yehudi!* He shot himself because I said 'Shoot yourself' and the pendulum swung. You were wrong about it being an . . . an automatonic autosuggestive whatzit. It was Yehudi doing it all the time. It was—"

"Shut up," he said.

But he went over and opened the door and I followed him and we went out in the hallway.

There was a decided smell of burnt powder. It seemed to come from about halfway up the stairs because it got stronger as we neared that point.

"Nobody there," Charlie said, shakily.

In an awed voice I said, *"He was not there again today. Gee, I wish—"*

"Shut up," said Charlie sharply.

We went back into my room.

"Sit down," Charlie said. "We got to figure this out. You said 'Shoot yourself' and either nodded or swayed forward. But you didn't shoot yourself. The shot came from—" He shook his head, trying to clear it.

"Let's have some coffee," he suggested. "Some hot, black coffee. Have you got— Hey, you're still wearing that headband. Get us some, but for Heaven's sake be careful."

I said, "Bring us two cups of hot black coffee." And I nodded, but it didn't work. Somehow I'd known it wouldn't.

Charlie grabbed the band off my head. He put it on and tried it himself.

I said, "Yehudi's dead. He shot himself. That thing's no good any more. So I'll make the coffee."

I put the kettle on the hot plate. "Charlie," I said, "look, suppose it was *Yehudi* doing that stuff. Well, how do you know what his limitations were? Look, maybe he *could* have brought us Hedy—"

"Shut up," said Charlie. "I'm trying to think."

I shut up and let him think.

And by the time I had the coffee made, I realized how silly I'd been talking.

I brought the coffee. By that time, Charlie had the lid off the pill-box affair and was examining its innards. I could see the little pendulum that worked the switch, and a lot of wires.

He said, "I don't understand it. There's nothing broken."

"Maybe the battery," I suggested.

I got out my flashlight and we used its bulb to test the little dry cell. The bulb burned brightly.

"I don't understand it," Charlie said.

Then I suggested, "Let's start from the beginning, Charlie. It *did* work. It got us stuff for drinks. It mixed one pair of drinks. It— Say—"

"I was just thinking of that," Charlie said. "When you said, 'Blow me down' and bent over to pick up the drink, what happened?"

"A current of air. It blew me down, Charlie, literally. How *could* I have done that myself? And notice the difference in pronouns. I said 'Blow me down' then but later I said 'Shoot yourself.' If I'd said 'Shoot me,' why maybe—"

There was that prickle down my spine again.

Charlie looked dazed. He said, "But I worked it out on scientific principles, Hank. It wasn't just an accident. I couldn't be wrong. You mean you think that— It's utterly silly!"

I'd been thinking just that, again. But differently. "Look," I said, "let's concede that your apparatus set up a field that had an effect upon the brain, but just for argument let's assume you misunderstood the nature of the field. Suppose it enabled you to *project a thought*. And you were thinking about Yehudi; you must have been because you jokingly called it the Yehudi principle, and so Yehudi—"

"That's silly," said Charlie.

"Give me a better one."

He went over to the hot plate for another cup of coffee.

And I remembered something then, and went over to the typewriter table. I picked up the story, shuffling the pages as I picked them up so the first page would come out on top, and I started to read.

I heard Charlie's voice say, "Is it a good story, Hank?"

I said, "G-g-g-g-g-g—"

Charlie took a look at my face and sprinted across the room to read over my shoulder. I handed him the first page. The title on it was "THE YEHUDI PRINCIPLE."

It started out:

I am going crazy.
Charlie Swann is going crazy, too. Maybe more than I am, because it was his dingbat. I mean, he made it and he thought he knew what it was and how it worked—

And as I read page after page, I handed them to Charlie, and he read them too. Yes, it was *this* story. The story you're reading right now, including this part of it that I'm saying right now. Written before the last part of it happened.

Charlie was sitting down when he finished, and so was I.

He looked at me, and I looked at him.

He opened his mouth a few times and closed it again before anything came out. Finally he said, "T-time. Hank, it had something to do with t-time, t-too. It wrote in advance just what— Hank, I'll make it work again. I *got* to. It's something *big*. It's—"

"It's colossal," I said. "But it'll never work again. Yehudi's dead. He shot himself upon the stair."

"You're crazy," said Charlie.

"Not yet," I told him. I looked down at the manuscript he'd handed back to me, and read:

I am going crazy—
I *am* going crazy.

THE END.

Cuckoo

A slightly overbearing female and a nervous little professor — harmless, if slightly queer folk, the Patrol figured. Just guys watching the birdies sing. But one of those birdies "sang" in an interesting way—

by P. SCHUYLER MILLER

Illustrated by Williams

Commander Jeff Norcross of the Triplanetary Space Patrol stared gloomily at his reflection in the surface of a warped chrome mirror and gave his bristling little mustache a few finishing touches. The Venusian climate did things to the silvering of any ordinary glass mirror, and this particular slab of high-reflective alloy had been flung at so many noxious pests of one sort or another that where it was not dimpled it was pleated in lovely waves.

He stepped back and examined the image of his dapper self with some satisfaction. Thank God he had been able to keep the birds and the beetles out of his dress uniform. The last plague of varmints had riddled his regulars and reduced him to a tablecloth skirt until young Hall cooked up an outfit he could wear without turning beet-red in front of tourists.

Spring was in the air, and that meant that summer was on the way. By all the laws of reason and experience the whole planet should be locked up under glass—and here he was trimmed up to the facsimile of a recruiting poster, fated to struggle through a formal dinner in honor of some weevil-brained professor who chose to spend six weeks of hell in the midst of the Preserve. It was enough to make a more impatient man than Norcross cut throats.

Five terrestrial years before, Commander Jeffrey Norcross, with fifteen years of service and hard work behind him, had muscled himself close to the top of his chosen

profession. He was one of the best electronics men in the Patrol. He was at home and in his element anywhere in the System and in a few places out of its bounds, he was space-burned and space-hardened as only a veteran can be, and he was looking forward to using up the other half of a long and fruitful life with the smell of hot metal and the vibration of purring jets seeping into his hide, and the stars spread out lavishly on all sides. When he was old enough, they might push him on up the scale of brass-hattery into a berth where he could wear more stripes and braid, and bumble and roar at the youngsters—but that was a long time in a future which he fully intended should be as eventful as his past.

Then someone, somewhere, pulled strings. God help that someone if Norcross ever found out who he was! Probably the fool had never kicked earth-dust off his shoes, or if he had he'd been space-sick from the minute he blasted off until he got safely back to the old green planet. Jeff Norcross was yanked out of a Patrol cruiser which was just off on a still hunt for space pirates, dunked in the gray goo which passed for the atmosphere of this accursed planet, and honored with the privilege of rotting here at a desk in a zoo, while cubs he had kicked into shape went out and garnered glory among the satellites. It was pure hell, and he didn't mean to endure it much longer!

The Patrol's part in the management of the great Morgan Wildlife Preserve was a stale joke on three planets and innumerable asteroids. The place had been a creation of the T-P Council, thought up by some brainstorm king as a fitting memorial to the pioneer of Venusian exploration. It took in a dozen or so largish islands which were scattered along the coastline of the west continent at the point where the cloud-splitting Skyscraper Range came down out of the heavens and drowned itself in the stinking sea. When some naturalist discovered that no *kru* had ever set foot on the islands, thanks to the abundant and ferocious population of the surrounding sea, he squalled loudly and in the right circles until the Venus government made the area a national park, then talked them into ceding it to the Council as a Natural Heritage.

The Preserve was run by the Venusian Rangers, civil service boys with natty gray-green uniforms, whose pleasure and duty it was to keep peace among the beasties and the birdies, herd the esteemed Public in and out of the place with facility, courtesy, and deference, and see to it that nobody ran off with the place between times. If the whole Preserve should slip into limbo some Sunday afternoon, *that* was the Patrol's responsibility, and Norcross could expect hell in red ink until he had found every stone and flower, and had them back where they belonged in time for the next gang of tourists.

It never had disappeared, but he dreamed of it occasionally.

From the other side of the thin partition which maintained his dig-

nity of rank during sleeping hours, Norcross could hear the splash of water and the tenor caterwaul of young Dave Hall, upraised in "The Bim at Bottle Joe's." Hall had been here for two years—the fool *liked* birds—and Jeff Norcross was working on an idea which should blast him to hell and gone out of this muckhole and let the young imbecile sit and glory in his feathered friends until he took root or laid an egg.

Dave Hall's caroling meant that there was a skirt in the breeze. One of the professors was a female. What Hall didn't know was that the creature's title was C. Virginia Banning—*Dr.* C. Virginia Banning—and Norcross hoped with all his heart that she would be a she-monster worthy of her name. He grinned with sheer sadism as he thought of Hall's expression when she walked in.

The youngster was buttoning his collar as he strolled out into the common room of the Patrol shack. Old ladies habitually wandered into the place under the misapprehension that it was a necessary convenience, but five or six human beings could cram themselves into it and be gregariously uncomfortable for hours on end if they saw fit. After all, the Patrol was the agent of the Council, and it was court etiquette for Professor W. Ouderkirk Simms, D.Sc., D.Ec., et al to pay a formal call on his arrival. It was also court etiquette for the Patrol to receive him with all formality and throw a full-scale dinner at which the Rangers would also be duly admitted and recognized, and everybody would be thoroughly uncomfortable for several hours.

Hall, as junior officer at the post, could wear his whites. Jeff Norcross had buttoned and zippered himself into a trim black-and-silver outfit designed to keep an active man warm in a half-insulated tender somewhere west of the Moon. That was etiquette too—or if you preferred, regulations. Norcross looked at the thermometer dial. The temperature in the little box of a room was pushing a hundred and twenty, which was its normal level whenever the refrigerating unit in the conditioner was indisposed, and the humidity was in the eighties. If the coolers ever did cut in suddenly, he reflected, they'd probably have a little cloudburst right in the middle of the floor. He suspected that borers had eaten holes in the plumbing and were getting plastered on refrigerant: it was their happy way of life. He had made a number of recommendations on the subject in his first year or two, but he was too old a hand to expect that anyone had read them. Norcross had been greaseballed into a fat sit-down job at the request of some politician. Then why, in all decency, couldn't he draw his pay, write his reports, and keep quiet?

The Patrol had one reasonably important function in this infernal hothouse. It was in command of communications. Any message to any point on Venus or off it had to pass through Patrol hands and go out over the Patrol communications

system. Norcross was rather fond of that system. It had been his only solace in the five years of his exile. He had tinkered and primped, added this and that, switched circuits and ordered new tubes, until he doubted that any electronics man anywhere could even guess how the thing worked without a two-day breakdown and a lot of tests. When he wiped the mud of Venus off his boots, that 'cations board was going with him if he had to burn the place down to get it!

Hall was studying the tape. Headquarters was in the habit of sending out newsy little tidbits to its every outpost at frequent intervals, if only to announce the time and weather on Deimos. The lean young Patrolman's blond hair was beginning to come unstuck at the back, and his skin was a flushed young pink. Women drooled over him, but in spite of it all, Norcross had to admit, he was a good kid—skirt-struck but serious and on occasion remarkably and surprisingly capable of taking care of himself.

"Look here, sir." Hall's formal rig seemed to make him a bit more respectful than was common. "They're still battling over the Annex. Some goop's put in a new bill about it."

The Annex was a large and inaccessible portion of the adjoining mainland, which some enthusiast in Laxa proposed to fasten on to the Preserve. It included the highest and least inviting peaks in the Skyscrapers and the dripping rain-forest which shrouded their windward slopes. Granted that the place was probably alive with unknown and unclassified birds, animals, and plants, nobody but a half-amphibian *kru*-man could possibly go there and stay alive, and nobody but a naturalist would ever think of doing it. It meant a few more million acres for the Patrol to worry over, and not a thing more, Norcross reflected. If the Laxa Government quit arguing and voted the thing in, he decided, the Council would probably feel its prestige warranted a three-man post, and they'd send him another subordinate. Hall was plenty!

What he might have answered would probably not have been printable, for he could feel his collar wilting and the crease going out of his knife-edged trousers with the seconds, but a step on the walk outside choked him off. Dave Hall

reached the door in one long stride and flung it open with grace and gusto.

Professor W. Ouderkirk Simms led the procession. He would have come to Hall's shoulder if he had cared to stand on tiptoe to try it. The top of his head had been planted with a stiff white herbage of about the length and distribution of the green variety which one occasionally saw growing from the skulls of plaster Hibernians in florists' windows back on Earth. His face was pink, pear-shaped, and full of little wrinkles, and his eyes were bright and beady. He had a nose as long and as sharp as Norcross' own hawkish beak, and a series of punctured chins draped one behind the other in descending sequence above a neat bow tie. He was wearing the formal professorial garb of the previous century —stiff shirt front, high collar, and flapping tails. He had a row of medals pinned unevenly over the breast pocket of his rather rusty coat.

Behind the little professor loomed a female whom Norcross took to be C. Virginia Banning—and his eyes glittered with wicked satisfaction as he sized her up. She had long red hair, cut raggedly to shoulder length, apparently with a kitchen knife on a bread board. It streamed out in all directions as though each separate filament were highly charged and repelling every other one. Her face was her own, and she was balancing pince-nez precariously on a nose which did nothing whatever to supply them with an adequate foundation. She was broad of shoulder, long of leg, and massive of contour, and she had dressed to display her squareness and massiveness to the greatest if not the best advantage.

Prominently displayed, in the manner of a corsage on the lady's buxom bosom, was a little black box, with a pair of insulated wires disappearing into her mop of hair. Norcross bowed formally and muttered politely, and she simpered back at him. Hall, ever the gentleman, offered her a cigarette and a glass. She answered in the deadly flat tone of the completely deaf.

"Thenk yew," she said. "Aye daown't smaoke."

The two Rangers who had followed the professorial pair into the shack made no comments. They didn't have to. Goose-Boy Williams had brought the pair from Laxa in the government launch, and Tom Chase, as chief at the post, had had to install them in the guest-house and minister to their wants for a full half-day. Both men sat back in evident satisfaction and watched Dave Hall get his.

Dinner was not bad, considering. Hall had somehow bulldozed one of the tame *kru* who were always hanging around the post at this season into learning a few human recipes. The little amphibious natives made good cooks if you could hang onto them, but another two weeks would see them buried in the mud somewhere back in the jungle, sealed up in a chrysalis of shellac, waiting the summer out. Estiva-

tion was their way of lasting through the hot months, when the Venusian forests grew gaudier and dryer, the air reeked of strange perfumes, and the nights were made hideous by the whoopings of howlings of bird and beast, preying energetically on each other, reproducing lustily and hurriedly, and boasting of their success.

Williams brought the Tuttle Bill into the conversation halfway through the dessert. In spite of the fact that their official orders came in on the Patrol line, in a code which any schoolboy could read upside down and backward, the Rangers maintained an elaborate fiction of secrecy and the Patrol duly respected the amenities. With his third spoonful of iced *goola* pulp, Williams announced that he had been ordered to make a survey of the proposed addition to the Preserve and submit it as soon as possible to the Legislative committee which was at that moment spending a fat appropriation in judicious investigation, several hundred miles away in Laxa.

The little professor pricked up his ears, and his shoe-button eyes grew brighter. If there was to be an expedition to the mainland, he wanted to join it. The islands were at least partially documented by previous experts, but the hinterland was terra incognita and he wanted in.

Chase, as Chief Ranger, tried to explain that the survey would be limited to an aerial reconnaissance, inasmuch as the place was to all practical purposes impenetrable. The professor was not satisfied.

"I was assured, when I undertook this mission, that I should have the fullest co-operation from the authorities," he said stiffly. "I am here to make a basic study of the ecological relationships governing the fauna and flora of this portion of the Venusian world. The mainland is a part of the environment—an extremely important part, I may say. I feel that I shall be within my rights in reporting this obstructionist attitude to the government at Laxa, and"—he glanced pointedly at Norcross—"if need be to the Triplanet Council."

Chase was growing red behind the ears. He'd been promoted only a few months before, when the former chief had been caught redhanded in some pretty skullduggery, and he didn't like the idea of being set back by this spike-haired little squirt. On the other hand, he'd be damned if he was going to let two greenhorns commit suicide by wandering into the wilderness west of the Skyscrapers with summer coming on.

"But we aren't going there ourselves," he protested.

C. Virginia had been listening intently, fiddling nervously with her hearing aid and glancing from one speaker to the other. Now she apparently decided that she should state an opinion, if only for the record.

"Aye must say that Aye cannot condone youah attitude," she stated tonelessly. "Aye am suah the Council must be anxious to knaow all that can possibly be discovahed

abaout this territory befoah any decision is made."

Dave Hall took pity on his colleague. "Look, ma'am," he said brightly. "You don't want to go out into all that muck and rubble when you can get the whole thing without leaving the post. There's a tribe of mountain *kru* here on the island right now, fresh over from the mainland, who can tell you anything you want to know. They'll even fetch you specimens if you want 'em. Whyn't you let me bring the chief to see you in the morning?"

"It appears, then, that there are natives in these supposedly impenetrable forests," the professor observed. "I assume that they have the usual trails and villages. Commander Norcross, I will appreciate your transmitting a message to Laxa for me. Immediately."

Jeff Norcross had been sitting back, enjoying the whole row. In his sour frame of mind, it did him good to see the boy scouts wriggle a little, but Professor W. Ouderkirk Simms, for all his degrees and medals, was beginning to get on his nerves. The pompous little toad royally deserved a setting back. He tilted his chair back and smiled wolfishly.

"The Range has not been added to the Preserve," he said slowly and precisely. "It is unassigned territory, and as such it is, under interplanetary law, the sole property of whatever natives claim it. The natives are the wards of the Triplanet Council, and all persons are forbidden by law to trespass on their holdings. That goes for the Rangers, and it goes for the whole exalted Venus Government. There's one exception, and we're it. The Space Patrol, as the instrument of the Council, goes where it has to and when it has to—but it goes alone, and it has to show a good reason. You can send an open message to any place in the System, if you want to, but it'll be blowing credits through your jets. We don't send private messages collect, you know."

The girl's listening device had slipped down inside her dress. She fished it out and turned in her chair so that she faced Norcross squarely. "The Legislatuah is discussing the mattah of the addition in Laxa at this very moment," she protested. "That does not correlate very well with youah statement, commandah."

Hall knew the mood Norcross was in. "Uh, doctor—," he blurted. She turned a wide-eyed

stare on him. "I can explain that. According to the rules, the Venus Government has to agree to buy the land from the *kru* and make it a preserve, before the Council can release it from the Native Holdings ban. Then they turn it back to the Council for part of the big Preserve." He gave her his best smile. "There was all kinds of dirty work with the *kru* in the early days, and the Council likes to be extra careful now. Matter of principle, you know."

When the girl smiled she was almost pretty, Norcross thought. A smart cosmetics man could do a lot with her. Trouble with these brainy women was that they didn't take time to learn how to be human. A few more months with this little monkey Simms, and she'd be past saving.

"Let me show you around in the morning, Dr. Banning," he said sweetly. "Patrolman Hall has some very important work to finish. Haven't you, Hall?"

Hall eyed him resentfully. All the time blowing his jets about women, and now singing serenades to this female Einstein. Let him have her! "Oh yes, sir!" he agreed hastily. "I certainly have, sir. Yes indeed!"

The important work, as it happened, consisted of sitting in the communications room with the "Space Officers' Manuel," boning industriously while Norcross did the honors for the lady and the two less fortunate Rangers tried patiently to satisfy the peppery little professor.

C. Virginia Banning next entered Dave Hall's young life late the following afternoon, when he had been emancipated from the radio room and was taking the air in the Preserve. He had located a colony of bee-birds in a stump at the edge of a small clearing a few weeks before, and had managed to install a sheet of clear plastic in one wall of their communal "hive" so that he could observe their home life without affecting their dispositions. The little bee-sized feathered mites lived in close-packed hexagonal cells ranked around a central shaft, up and down which they could float like helicopters. Their bodies were bright yellow, with transparent wings that whirred so fast that the winged mites passed with the zing of a high-speed rifle bullet.

Something had set the bee-birds on edge that afternoon, and Hall soon discovered that the something was Dr. Banning. She was up to her knees in a clump of shrubbery at the far side of the clearing, holding something in one hand and swatting at the circling birdlets with the other. They were swarming around her roseate coiffure as though it were a huge sun-blossom.

Hall let out a yelp of warning. Swatting bee-birds was like tickling hornets. The little creatures had touchy tempers. If her hair interested them, she'd better get it out of sight—and fast. He told her so concisely and furnished the bandanna to put over it. When that didn't have much effect, he squeezed the pungent, milky juice out of a handful of *zil* leaves and doused her

headdress until the bee-birds gave up in disgust.

She had dropped whatever it was she had been examining when the bee-birds scented her. Hall's curiosity was aroused, and when she strode manfully away with a formal word of thanks, he let her go. The moment she was out of sight he turned back to the clump of bushes where she had been rummaging. In the soft mold of the forest floor just beyond them he spotted her square footprints and the footprints of a native. They had the long, prehensile toes of the mountain tribes, evolved for clambering over rocks and through the branches of the giant trees of the Venusian rain forest.

Hunching down, Hall peered into the shrubbery. At first he could see nothing, then as he straightened up a spot of bright pink caught his eye. He teased the branches carefully aside, uncovering a neat nest of grass and twigs containing four eggs.

There was nothing unusual about the nest. He'd heard a male whippersnapper's distinctive *"zzzip-crack!"* around the place before, and knew there must be a nest somewhere close by. Three of the eggs were ordinary whippersnapper eggs, pale-green with darker green blotches, but the fourth was a gaudy sunset pink. It looked like an Easter egg. It was a shade bigger than the other eggs, and had a different shape—blunter and fatter.

The crunch of footsteps on the gravel of the clearing warned him that C. Virginia was back again. The professor was with her.

"Aye should prefuh that yew dew *not* touch the nest," she said sharply. "It is essential that the egg be pairmitted to hatch without interference."

"That's no whippersnapper egg," Dave told her. "I don't know how it got here, but it don't belong in that nest. The *kru* like to pick up bright-colored things and tote them around. Maybe one of them put it here."

"The *kru* called my attention to this nest," she informed him. "Aye have their word that they will not disturb it. Aye must ahsk yew to withdraw!"

"Permit me." Professor Simms moved her gently out of his way and drew himself up to his full height. "Mr. Hall—I have been told that you profess to be a student of ornithology. You are doubtless aware of the habits of *Cuculus canorus* and its co-species?"

"Oh, sure!" Dave Hall had had two years of college Latin before he gave up the idea of becoming cultured and turned to engineering. "Cuckoos. But there's no cuckoos on Venus."

"Ah!" The midget professor's mouse-eyes glittered. "Are you *sure*, Mr. Hall, that there are no cuckoos on Venus? If I may say so, the very fact that we have so remarkable a parallel evolution of life forms on the two planets would lead us to expect just such parasitism as is characteristic of the *Cuculi* and the American *Molothri*, would it not?"

"Maybe," Hall admitted, "but I've been here two years. I know every inch of this island and every bird on it. I've never seen an egg like this, or a bird that would lay it."

"Nobody can claim familiarity with the avifauna of a planet in two years," the professor chided. "It is the nature of the cuckoo to be a wandering and elusive bird."

"A wandering voice," commented C. Virginia smugly.

"As the poet so aptly expresses it, 'a wandering voice'," agreed Professor Simms. "This particular individual may have extended its range from an adjacent island, or even from the very mysterious mainland. We must take every precaution to insure the protection of this evidence of its existence, and trust that the foster parents will hatch and rear it safely."

Dave let the branches slip back over the nest. "You're the expert, professor," he agreed resignedly. "Maybe I've missed something. I'll keep an eye open, and maybe I can spot this cuckoo it it's still around. Maybe they'd name it after you—*Cuculus Simms-Banningi.*"

The professor raised his bristly eyebrows. "You are joking," he stated reprovingly. "You must be aware that the same generic nomenclature cannot be applied to these Venusian creatures as to real birds on Earth. The taxonomy of Venusian avifauna is a primary concern of Dr. Banning's in our present work. You may leave this matter safely in her hands."

If she wanted it, Dave Hall decided, she could have it. But he still didn't believe in cuckoos. He smiled politely and clumped away into the woods. He had some plans of his own where this blooming Easter-egg was concerned.

A week later relations between Patrolman Hall and the visiting experts were not particularly cordial. The female whippersnapper was back on her nest and incubating all four eggs as though they were her own, but Dave had paid a *kru*-man very well to stand guard over the nest and keep anyone—and that included professors—at a safe distance.

Meanwhile he had devoted himself to the search for the elusive cuckoo. He'd never met a real cuckoo—the European, egg-laying kind—back home, but he'd seen plenty of cowbirds, and he'd never met one which was content to lay one egg in one nest. Unless the bird had gotten itself eaten—which wasn't impossible, of course—there should be other pink eggs in other nests not too far away—and there weren't any.

He tried to argue the thing out with Norcross one night, but the commander had troubles of his own. The professor had brought in a lot of electrical equipment, and it was raising hob with the new-fangled installation Norcross had dreamed up for the Patrol station. He'd shielded his circuits as best he could, but he kept picking up a persistent signal on a very short wave length, and he couldn't tie it up

with anything he'd seen in the professor's outfit.

Ten days after Dave found the pink egg, the whippersnapper which had been brooding on it died. The *kru*-man who was on guard at the nest brought the bird's body to him apologetically, dead as dingbat, without a mark on her. Hall noticed that the *kru* had some kind of poultice strapped to his armpit, and scars of old sores all over his body. He tried to question the little native, but the difference between the lowland and highland dialects was too great for him to get very far with it. He caught some kind of comment about "mountain sickness," but it didn't seem to apply to dead birds. He dismissed the *kru* and busied himself with a box and some wires. When the professors got back from a trip through the archipelago, he showed them the abandoned nest, neatly installed in a homemade incubator.

Banning didn't like it much, but the prof really blew his linings. He accused Dave of doing the bird to death, and damned his interfering nature up and down and around several corners. He insisted that the incubator be turned over to him, and when Dave proved stubborn he appealed to Norcross. That got him exactly nowhere. Jeff Norcross didn't like Professor Simms.

Dave pointed out with satisfaction that the insulated box was maintained at exactly the mean temperature shown by a series of thermometers stuck under the wings of roosting female whippersnappers, as shown in print in one of the professor's own treatises. The eggs were turned mechanically at exactly the times when an average whippersnapper would turn them. The humidity of the incubator was precisely that of the spot where the nest was found. He even volunteered to get a recording of forest noises and have them played over and over to the hatching eggs, if the eminent professor thought it would help any. The professor didn't. Finally his colleague had to insist—and rather peevishly, Dave thought—that he come away and give his blood pressure a chance to get back to normal.

Jeff Norcross paid the professors a visit that night, ostensibly to smooth things over but actually for another look at their room full of electrical equipment. He came back muttering into his mustache. As far as he could see, the whole infernal mess had no other purpose than to make ultra-high-fidelity wire records of bird calls and take the prof's dictation.

The time came and the time went when good whippersnapper eggs should have produced good little whippersnappers. They didn't. Norcross rigged up a contact microphone, and they listened in on the eggs. The three normal-looking eggs were dead, but the pink one had a husky foetal heart-beat. Apparently it had a longer incubation period than the eggs with which it had been laid—and that in itself argued against the cuckoo theory, because in the normal course of events the whole whippersnapper family would have hatched and left

the nest before the whosis in the pink egg cracked its shell. Dave said as much to the professor, who immediately accused him of bungling, and a rousing verbal battle ensued which was particularly enjoyed by Norcross, who recorded the whole row for future entertainment when he felt low.

Dave sent the defunct eggs to Laxa for an autopsy, and the boys at the Patrol lab claimed that the things had somehow been doused with gamma rays or their equivalent in high-power radiation. By now the last of the *kru* had holed up for the summer, but Hall was beginning to get a feeling that the sore on the native's arm had been very much like a radium burn. All that, plus the pink egg, should add up to something—and it wouldn't be cuckoos.

Dave had a favorite perch on an exposed pinnacle of rock, about two miles back in the jungle, from which he could look down on the tangled shoreline of the island and on days when the mist had burned off could get a spectacular glimpse of the Skyscrapers, rising in a black wall from the oily sea. He had been there for an hour, and was no farther along with his puzzle than he had been when he came, when suddenly, far out over the treetops, he saw a spot of moving color. He got his glasses on it, and saw that it was a bird—and a strange one. It was bright red, too big to be a king-teller and too small for one of the crimson darters which occasionally wandered down from the north. It could be a cuckoo.

He was not the only one to spot the red spark against the green. A large grayish bird had been perched on the bare limb of a tree, half a mile or so from Dave's rock. He'd identified it as a zoomer, a small Venusian hawk, and let it go at that. But as the dot of speeding red appeared over the forest, the hawk spread slender wings and dove into space. It swooped low over the treetops, its gray-green plumage blending with the dry foliage, came up like a looping rocket, and snatched the crimson speck out of the sky. Rolling in the air like a stunting strato-pilot, the hawk vanished into the distance with the puff of bright plumage clutched in its talons. Hall followed it with his glasses until it dropped out of sight, took a compass bearing, and slid down off his rock.

It took him until late afternoon to find the zoomer's nest. Although he was reasonably sure the red mystery-bird would long since have disappeared down the gullets of the hawk's rapacious young, he was

quite prepared to sacrifice them in the hope of assembling whatever might be left of the crimson creature. For the first time since he had come across the pink egg, he was willing to admit that he might have found the professor's cuckoo.

He hadn't. What the thing was, he showed Jeff Norcross behind drawn blinds late that night. The commander's eyes narrowed as he studied it. He picked it up and reached for a tiny power saw. In a moment the thing's scarlet covering lay in two neat halves on the table, and its gleaming metallic innards were exposed.

"That," said Norcross thoughtfully, "is the strangest piece of machinery that I have ever seen or hoped to see!" He pointed a blunt finger at the maze of delicate wires. "Look at those tubes. They've been designed for this thing. If there's a science of microelectronics, it was cooked up to produce this little gadget. And I thought I knew communications! I thought I had stuff that would boost me out of this stinking hole! I might as well go out and bury myself!"

"What'll it do, chief?" Dave Hall looked as though he'd eaten ten canaries.

"Do? What won't it do? It flies, naturally, since it's built to look like a bird. It sees—picks up a view with this little bit of a scanner, and narrow-casts it back to a pickup somewhere. No, by all the devils, it doesn't 'cast it! It cans the stuff—light, sound, and all—records it in the form of magnetic impulses on this spider-hair wire, to be taken off later. And this little mess of giblets is the illegitimate offspring of a broadcasting Geiger-counter, or I'm a boy scout!" He sat back on his stool and unscrewed his jeweler's lens from his eye. "Where in three stinking planets did you get this little marvel?"

"I'll tell you all about it, chief," Hall promised, "but right now it's got to go back where it came from. Can you get it back together, the way it was? And for holy's sake—is that scanner working all this time?"

"Working? No, it's not working. Would I be blowing my jets like this if the thing could pick me up? It's got to powered to work, and the power pickup's smashed. But I'll tell you one thing, you young whelp! *This* is the songbird that's been whistling in my earphones for the past two weeks. This is the gadget that's bolluxed up my whole installation. It rebroadcasts the power-waves, all muddled and fuddled up into audio-hash, and I've been getting 'em."

"Sure—that's what I figured." Hall was in a hurry. "Right now I want to know if you can put those fake feathers back on its carcass. And I want to know if you can set up a couple of finders that will give us a bearing on the place those warbles of yours are coming from."

"I know all that!" The commander's neck was getting red. "Think I'm a nincompoop, do you? Think I'm a rookie, do you? I put directionals on the thing the minute it began chirping to me. I know where it does its singing. The

mainland—that's where. Right in the middle of the Morgans, where there's not even *kru*. Why, I had Chase run a special survey over the place and the cameras couldn't spot a thing." He glared at the tiny mechanism in his hand. "I didn't think I was looking for a dicky-bird!"

Hall grinned. "Swell! Now—can you put it together again?"

Norcross stared at him wrathily. "Think I'm incompetent, do you? Think I'm doddering on the edge of the grave, do you? Think I'm a bumble-fingered pen-pusher that's lost his space-legs, do you? Well, I'm as good as I ever was—and better. That red stuff's a thermoplastic, so it'll weld. I'll weld you a seam you couldn't find with a microscope. By the time I've touched it up on a wheel, you'd never know the shell was off. That what you're after?"

"Right!" Dave Hall was halfway to the door. "I'll be back in a minute."

The tiny machine was a bird again, so far as appearance went, when Hall returned with a big, ungainly-looking b i r d struggling under one arm. It subsided when its ultra-sensitive nostrils scented the infinitesimal vapor-pressure of copper in the laboratory. Gulpers were copper-crazy. They lived for the tingle of copper salts in their blood and the scratch of copper crystals in their gizzards. Two or three of the things were always tagging Goose-Boy Williams, around, snapping at the brass buttons on his uniform.

Norcross was bent over the mechanical bird, touching up the vanes in its plastic feathers. He went rigid when he saw what Dave had. One gulper turned loose in his communications room could blot the post off the map of space for days to come.

"Get that thing out of here!" he raged. "Get it *out* before I break you down to a bilge-swab! I said get out!"

Hall was having his troubles. A gulper is turkey-sized, tastily tinted with purple and magenta, with a powder puff for a body, legs draped in blue feather pantalettes, and a scarlet tail like a rooster's. This one had lost half its tail and was growing a new one. It was cock-eyed, with a curving yellow bill like an oversized curlew's, and it smelled to high heaven of ripe old cheese. It was screaming at the top of a calliope-voice, and slashing at Dave's thighs with claws which were fortunately dulled by many battles.

"Look, chief," he panted. "Bring that gadget here and feed it to this brute."

Norcross goggled. "You mean I dressed this thing up so's you could feed it to a stinking gulper?" he demanded. "You young jet-louse, I'll—"

"Hurry up!" Hall wailed. "Feed it and let me get it out of here. I can't hold it much longer."

The commander held the tiny machine out on one palm, like an apple for a horse. The gulper stopped

squawking, cocked its wattled head on one side, and glared suspiciously at the little gadget. Apparently it smelled of copper, for it gave a lightning jab with its scimitar beak and got both the bird and a chunk of Norcross' hand. It spat the latter out, flung back its head, and swallowed the "cuckoo" whole. It gulped, wriggled, burped, and began to yell for more. Hall yanked open a closet door and crammed the whooping horror inside.

"In the morning," he said, "we kill it."

"In one minute," said Norcross, "you talk. Or I kill *you*."

Dave took in his chief's grim expression with a twinge of alarm. "Look, sir," he pleaded, "I'll tell you the whole thing—only we have a lot to do. Can you use that layout of yours to tap the I.P. line and get me Mike Bailey?"

"I.P.? Hall—you know regulations on press stuff!"

"Sure—but can you? I don't want to tell him anything—I want to ask him."

Norcross eyed him suspiciously. The challenge to his pet hookup got the better of his good judgment. "I can get you any line on three planets and more asteroids than you can c o u n t!" he retorted, flipping switches and twiddling dials. "You want him walking or talking?"

"It'd better be a two-way visual," Dave decided. "He may not want to give out unless he's sure I'm me. He ought to be in the Laxa office this time of day," he added helpfully.

"Whyn't you say so?" Norcross snapped. He made a fine adjustment and opened a final circuit. The scanner panel in the middle of the board lit up, and he swung his chair aside. "Sit down and talk," he growled. "And don't monkey with anything."

The Interplanetary Press office in Laxa was usually empty except for the man on duty at this time of night, for the human population of Venus was pretty well concentrated in one time-zone. Mike Bailey was a grizzled veteran of rare old vintage, but his sour face lit up when he saw Hall's grin in his 'visor.

"Hi, Pup!" he called. "What's nibbling you?"

"Look, Mike," Dave said earnestly, "this is off the record, but you can keep your line to HQ open for when it breaks. What's happening to the Annex?"

Bailey's bushy white eyebrows dipped in a V. "The Annex? What should be happening?"

"Never mind that," Dave pleaded. "You'll get it. Is the Tuttle Bill going through, or is someone trying to kabollix it?"

"Going? It's through!" the newsman told him. "Went through this afternoon. At the very last minute a whole gang of the boys you'd expect to hang the vote until the Sun freezes tossed in with the Administration, and it went through so fast it scorched the ink."

"Uh." Dave Hall sounded as if he'd had the wind kicked out of him. His innocent blue eyes were full of dismay. "Thanks, Mike—,"

he began, but Bailey interrupted him.

"There's a rider on the bill," he said. "Something about a three-month lapse for investigation before the place is turned over to the Council."

"Oh my gosh!" Dave's voice registered pure dismay. "What about the release?"

"Well—what about it?" Bailey seemed puzzled. "Naturally that's just a formality. Lessee—its just about daybreak in London now, by my clock. The Council's sitting in Washington this session—and it'll be about the first thing they do. You figure it."

Hall was counting furiously on his fingers. Eight hours at the outside. "Look, Mike!" he begged. "You gotta get something started. Some kind of rumor. Don't say what it is, but get people talking. And see that it gets to the Council—fast—before they open the session."

Mike Bailey's eyebrows were up around his scalp line. "You think I'm unscrewed?" he demanded. "You think I want the whole Laxa government in what hair I've got—and the Council on top of it? You think I want I.P. kicked off of Venus? Start your own cockeyed rumors!"

"I'll keep you clean," Hall told him. "I can't give you the stuff now, but I'll have it all inside of eight hours—easy. Only we can't wait. We've got to have it on the air and in every morning newstape when the Council gets out of bed. Pick on that delay clause—it's got to be in that. Stir up a stink about it. Intimate that there's been dirty work behind the scenes. Talk about a deal that's going to strip the pants off the poor, defenseless *kru*. Get a quote from the native aid societies—they'll talk if you stir 'em up. We've got to keep the Council from putting a rubber stamp on the release until I can get the worm pried out of the *goola*—and by the time they get around to asking you for answers, I'll have 'em. It's a promise! I'll quit the Patrol if I don't come through."

Jeff Norcross was a man who made up his mind quickly, and for good. He spun the youngster out of the way and stuck his own scowling face in front of the scanner. "Bailey!" he marked. "You know me. You know what I say goes. Get after it!"

He reached for the switch. Bailey's amazed face faded out.

Norcross wheeled on the flustered Hall. "You," he said savagely, "were going to tell me the whole story—remember? Tell it! And make it good!"

Dave was pale. He could be wrong—and now the chief was in it. If he slipped up, they'd be mud-bound for the rest of their days. "Gee, chief—," he began. A gong drowned him out.

He forgot what he was going to say. One skittering leap took him across to the incubator. That gong meant that the pink "cuckoo" egg was hatching. It meant that something inside the egg had moved enough to trip a hairspring balance he'd rigged, and sounded the alarm. He yanked open the door of the insulated box.

The chick was wearing half the pink eggshell for a collar. Its head had gone through in one place, and the rest of it somewhere else. It was stark naked except for a little topknot of stiff black feathers like a peacock's crest. It's gangling legs were twice as long as all the rest of it combined. It opened a beak that nearly sliced the top off its ugly head and let out a soprano hiss. It was like nothing Dave had ever seen.

There *was* a cuckoo.

Dave reached for the switch which would shut off the gong. His knuckle touched the button which controlled a small light inside the incubator. The light went out—and behind him Norcross gave a startled grunt. The cuckoo glowed.

The creature's naked skin was washed over with pale bluish white light, brighter at the tips of the tiny pimples where pinfeathers would be breaking through, so that it seemed speckled with blue fire. Its spiky crest was yellow-green and its beak pale-salmon. Its legs were black, so that it seemed to hang, swaying, in empty air.

There was a hard sort of grin on Jeff Norcross' thin lips. "Hall," he said, "maybe you've saved your fool neck again. I think I see what you're driving at. But what do we do with that—and when do we visit the professor?"

Outside it was growing light. In the closet, the outraged gulper was emitting muffled whoops like an inebriated Comanche on the warpath.

"I'll take care of the bird end of this business," Dave told him. "Do you suppose you could kind of confuse one of those little flying gadgets?"

The sun was crowding over the treetops, like a spotlight behind endless layers of gray gauze, when the first signs of life showed in the guest house. Professor Simms came to the door, studied the horizon, and disappeared inside. At the windows of the headquarters shack Norcross and Hall watched him patiently. He made two more trips to the door before he decided to climb the hill in person. Dave met him on the terrace outside the shack, the dead gulper swinging by the neck in one hand.

"You're just in time, professor," he said. "This poor goose seems to have et something it shouldn't. We're having us a little autopsy."

Professor Simms looked at him sharply, but followed him into the shack without comment. Norcross was leaning back against the communications board, 'phones on his ears, watching the proceedings with apparent interest. He raised a finger to greet the professor. "Testing," he muttered. "Testing. Testing."

Slapping the carcass of the gulper down on the table, Hall parted the feathers of its belly and deftly slit open the skin. The bird had a huge crop which he removed and opened. Nested in a tangle of copper wire, brass grommets, and corroded buttons was the crimson "bird."

"Here's your cuckoo, all right, professor," he said. "You suppose it's new, the way you thought?"

The professor's beady eyes studied him. He made no move to pick up the tiny crimson form. "My colleague will be interested in this," he said. "She is the ornithologist. Have I your permission to summon her?"

"Certainly, professor." Norcross took over the conversation from his place at the board.

"Thank you, commander." The professor raised his voice slightly. "Dr. Banning—I think you can be of use here."

He lifted his lapel, revealing a small black disk much like the girl's hearing aid. "A device we have found indispensable in field work," he explained. "It enables a large party to keep in communcation while in the field."

"You might tell Dr. Banning that the egg has hatched," Dave suggested.

"I had . . . ah . . . noted the shell, there on the table," Professor Simms told him. "Yes. I am sure Dr. Banning will be anxious to examine the . . . ah . . . chick. Is it . . . ah . . . similar to this specimen?"

Norcross shook his head. "Not at all," he said. "It's puzzled us a little. Maybe this little red one isn't your cuckoo after all." He slipped his hand into the pocket of his tunic.

There were footsteps on the terrace. Hall opened the door to let in Dr. C. Virginia Banning. "Yew wahnted me, Professah Simms?" she inquired nervously.

"The egg has hatched," the little professor anounced. "These gentlemen thought you would be interested. And they have discovered —this." He held out the red-feathered mite.

"We discovered something else," Norcross interrupted. "Hall—show them."

Dave Hall wheeled out a massive-looking apparatus, shielded with heavy plates of lead and powered from leads the size of his thumbs.

"This is a gadget I put together for some experiments with that egg of yours," Norcross observed. "It's a very convenient source of slow neutrons. Professor Simms—will you be so good as to place a fragment of the shell there in the clamp, at the focus of the beam?"

A queer little smile crept over

the professor's pink face as he picked up a scrap of the broken shell. Hall stood waiting with his hand on the power switch. The professor stepped carefully around the table and fastened the shell in place. His mouse-eyes were shining oddly, and Norcross was watching him like a cat. He stepped back—

"You fool!" It was the girl. She flew at the machine and wrenched at the clamp which held the egg. The soft shell broke under her fingers and she ground it into the floor with one foot. She spun to confront the professor, her glasses off, her eyes blazing. "Are you trying to kill us all?"

Norcross got slowly to his feet, his hand still in his pocket. "What's going to kill us, Dr. Banning?" he asked silkily. "Not a common cuckoo's egg, surely."

The flat, deaf note had gone out of her voice. She seemed slimmer, lither, more alive. "Simms," she snapped, "smash that communications board. I'll keep them where they are." There was a tiny pellet gun in her palm. One of its miniature shells could blow a man in two. Norcross fingered the butt of his own gun ruefully. If Hall would get his carcass out of the way—

"I'm sorry," the little man said.

"I'm afraid I must." He relieved Hall of his gun, smiled apologetically as he took Norcross', and circled the commander to reach the panel. He surveyed it, then glanced quickly at Norcross. The commander nodded.

"From the beginning," he said.

The little man turned slowly with his back to the board. There was an odd note of tension in his voice. "You will be interested, Dr. Banning," he said, "to know that Commander Norcross has been in communication with Laxa throughout our little drama. Shall we end it?"

In his hand Hall's gun spoke. The slug nicked the girl's right side, close to the elbow; she whirled and yanked at the door as the second buried itself in the wall beside her, shoulder high. It opened and she stepped into the arms of a tall figure in gray-green. Before she could raise her gun, Goose-Boy Williams clipped her neatly on the chin with a man-sized fist. He caught her neatly in his other arm before she could fall, and eased her down into a chair.

"Women oughtn't to play with these things," he complained as he took the pellet gun out of her hand. "They always get hurt worse than the thing they're shooting at."

The professor laid Hall's gun on the table beside the gory carcass of the martyred gulper. He placed Norcross' weapon beside it. "You will want these," he said. "I shall be glad to . . . ah . . . explain anything you may care to know."

Dave Hall's thumb jerked at the communications panel. "Tell it to them," he grinned. "The chief's got you an all-star hookup—lines to Patrol HQ on the Moon, one to Interplanetary Press in Laxa, and another to our very good friends of the Rangers. Mike—you get it?"

Mike Bailey's husky voice shouted out of the speaker plate. "Clean!" he told them. "On wire *and* film. If the boys on Luna didn't get it, they're welcome to tap mine. One end of the wire's 'casting to Washington right now—and the film will be in your Laxa headquarters in ten minutes. You got any more?"

Professor W. Ouderkirk Simms, D.Sc. and D.Ec., stepped in front of the scanner and jerked down his vest. "I have a great deal more," he said precisely. "I shall be glad to be heard."

From the edge of the terrace in front of the Patrol shack, Dave Hall looked down the length of the narrow channel along which the government launch was conveying two eminent savants to a warm reception in Laxa and elsewhere. By half turning he could see three specks of crimson whirling in an eternal circle around the ventilator shaft of the commander's laboratory. Three of the things was more than he'd expected.

Norcross came out of the shack. "Get a ladder," he said. "Get a butterfly net. Get anything you can—and get me those cuckoos before they burn out a tube and crash. I want all three of 'em—whole."

Dave grinned winningly. "Gee, chief," he said, "when you get these

gadgets studied out you'll have a hookup that'll be a beater. You figure they'll let you back in active duty?"

Norcross returned the grin. "Patrolman Hall," he said. "Luna knows that if they want to prevent accidents to this very, *very* delicate apparatus, I am going to have to deliver it to HQ in person. And once I get the mud of this planet off my boots it will take more than the T-P Council to get me back."

"You know," Hall said thoughtfully, "that babe could of been something if she'd only taken the trouble. I thought she had you hooked."

Norcross was growing red behind the ears. "How does it happen that you were so smart, Patrolman Sherlock?" he asked sourly. "I've never seen a woman yet that didn't have you mooning over her inside of two hours."

Hall tried to look modest. He wasn't very successful. "Well," he said, "her hair was dyed, of course. I don't like fake redheads."

Norcross stared at him. "How did you get that?" he demanded. "I've seen wilder hair than that—*and* redder."

"It was the bee-birds," Hall explained. "You have to use a kind of herb rinse to get that color, and they smelled it. I had a girl once who used it. She used *zil* juice after that to keep 'em off. Besides—I knew she wasn't really built that way—like a horse, I mean." He grinned sheepishly. "She hung her laundry up where I could see it."

The commander snorted. "That little professor had me going," he said. "I suppose the little bilge-louse was *trying* to stir us up all along. That's why he kept blustering like a fool, and she kept trying to tone him down."

"I suppose when that *kru* wakes up in the fall he'll have forgotten the whole business," Hall complained. "They always do—but they home like pigeons. You figure we can spot him from that uranium burn, and trail him back?"

"You can," Norcross told him. "I'll be in space with a ship under me. I'll be where I can smell the stars instead of stale fish and rotten cabbage."

"I'd kind of like that," Dave said wistfully. "Chief—do you suppose—"

"Forget it!" Norcross told him. "One ticket to heaven out of this ruckus is all we're gonna get—and I'm using it. You'll get my job, I imagine. You can sit here and raise canaries. Or maybe it'll be cuckoos."

"O.K., chief—maybe you're right. But look. The way I see it, that pink egg was laid by a whatsit somewhere up in the Skyscrapers where there's a whopper of a deposit of uranium. There's uranium salts that are pink, and that's what made the egg that color. She spotted that the minute the *kru* showed it to her, and when she saw me snooping around she dropped it in the bird's nest and played cuckoo. Only it was full of ura-

nium, so it killed the old bird when she tried to hatch it, and the other eggs that were near it. I guess it burned that *kru,* too—they carry stuff under their arms."

"All right—so there's uranium up there. They know it now. That takes it out of the Native Holdings class and makes it a Planetary Resource. They'll buy off the *kru,* or move 'em somewhere, and post a guard over the stuff big enough to fight off an army of crooked politicians. Maybe you'll get to boss it. I'll put in a word for you if you'd rather do your sitting over there."

"You don't get it, chief," Hall objected. "That uranium was *in* the shell. It wasn't just radiations that changed the color. Don't you get it? There's some kind of bird up there that maybe eats uranium the way a gulper gobbles copper—and converts it into shell coloring. And those tests you made showed that the stuff in the shell was nearly pure 235."

"By all that's damned!" The commander's lean chin sagged. "That's what they were after. It *was* birds."

Dave Hall's chest was pushing the buttons of his tunic to the danger point. "Sure it was birds," he said. "That's why they had to have the professor. He was the bird man—not Banning. He was the one who knew all about *Cuculus* and that stuff. Banning's job was running the 'cuckoos' and keeping an eye on the prof. She's old Tuttle's girl friend. The old *zwilp* got wind of uranium in the Skyscrapers and cooked up this idea of pretending to take it for the Preserve and then at the last minute having a distinguished scientist like Simms report the lode. With those flying Geiger counters, they probably had every uranium deposit on this side of the 'Scrapers mapped to the last square inch, ten days after they got here. But they wanted those birds—and the prof was supposed to find 'em."

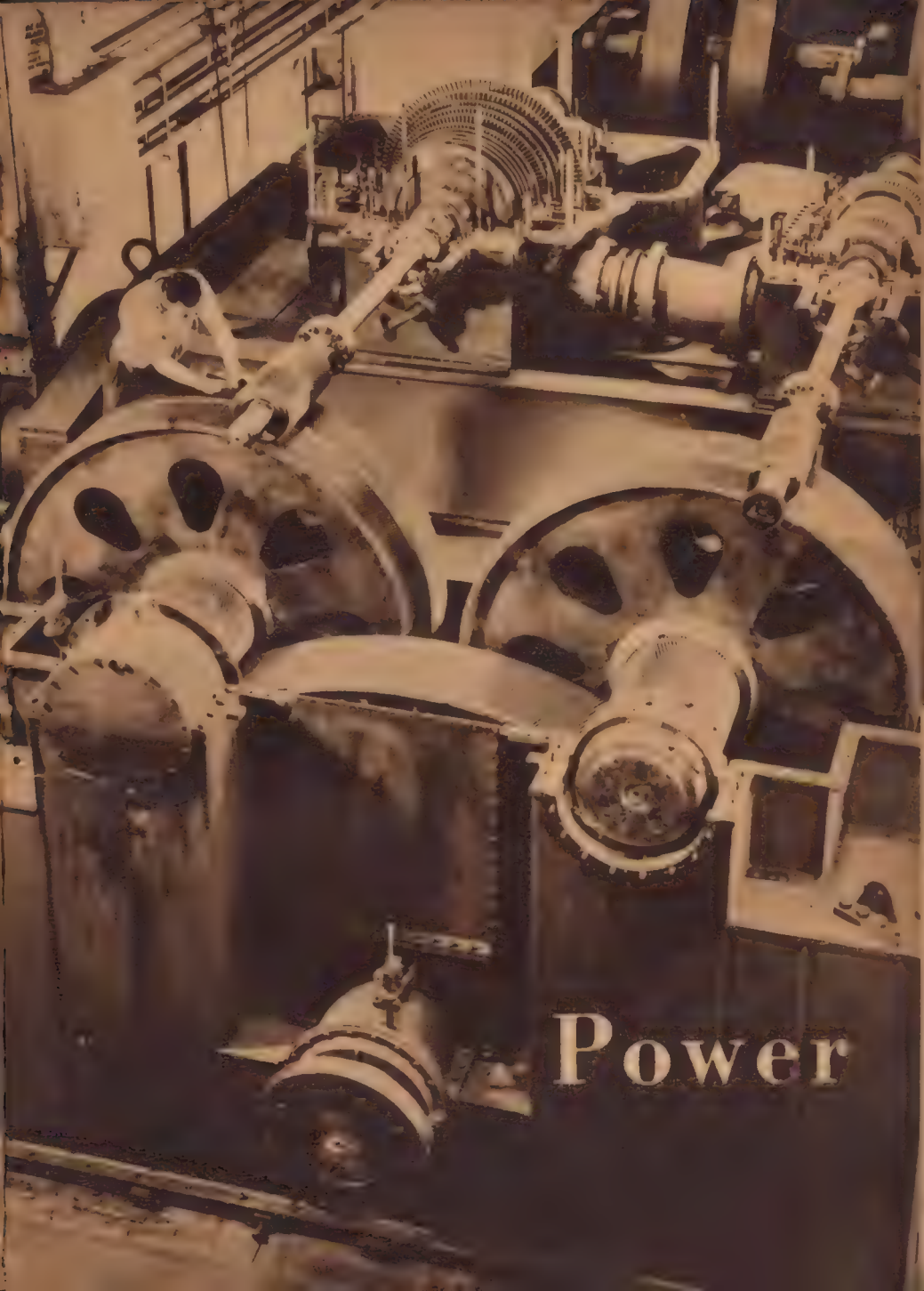
"Patrolman Hall," said Norcross thoughtfully, "you may get to see a couple of stars at that. The man who can produce a flock of chickens that can salt U235 out of a mixture of isotopes has a big future in the poultry business. Where'd you put that squeaking lighthouse?"

"Where I figured Dr. C. Virginia Banning wouldn't look for it," Dave told him. "I don't know whether the prof spotted it or not. He was trying to tip us off from the start, anyway. He was quite a guy when you got to know him."

"All right!" Norcross had had enough of riddles. "Where is the thing?"

"In a bird's nest—right under Banning's window," Dave told him. "It was supposed to be a cuckoo, wasn't it?" He frowned. "They're stuffing it with worms like it was one of their own brood, but—I wonder whether we'd ought to feed it on uranium. It's going to be expensive—"

THE END.


Power

On the previous page is shown a Victory Ship main drive unit nearing completion. The small gadget at the upper right is the high-pressure steam turbine; at the upper left is the low-pressure turbine. The really big, spectacular masses represent weight sacrificed on the altar of fundamental incompatability—the reducing gears. A steam turbine is a wonderfully efficient device, when it is allowed to operate at its natural, high speed; a ship's propeller is a highly efficient mechanism for transforming rotation into linear motion—when operated at its natural, but low, speed. Since the high-pressure turbine works best at a somewhat higher speed than the low-pressure turbine, that difference of natural characteristics has to be adjusted, too. The original Liberty Ship design incorporated reciprocating engines,

slower and less efficient than turbines, because the hobbing machines required for such dainty bits as the nine-foot-diameter bull gear were not to be found lying around idle. Reciprocating engines could work at low speeds, eliminating the need for gearing. Now, partly by construction of new, giant hobbing machines, but equally by redesign of the huge gears for quicker production, the faster Victory Ship engines are being made in quantity. It takes only six days to chew that main "bull" gear out of the hard steel blank now, instead of seventeen, at the Westinghouse plant.

Another speed incompatability has been met in an opposite way in the electric motor above. About the size of a standard one-eighth horsepower washing machine motor, this little job turns over not at the usual 1800 revolutions per minute, but at 1000 revolutions—per *second*. The problem; in grinding, polishing or routing metals, the grinding surface should move between 5000 and 7000 feet per minute relative to the metal. With a one-foot diameter wheel, that's easily accomplished—1800 RPM gives a surface speed of 5650 feet per minute. But it's slightly difficult to grind the inner surface of a two-inch diameter cylinder with a twelve-inch diameter wheel; anyone with an explanation of how to accomplish it will be welcomed in Probability Zero. A half-inch wheel is wanted—but that means a speed of 42,000 RPM.

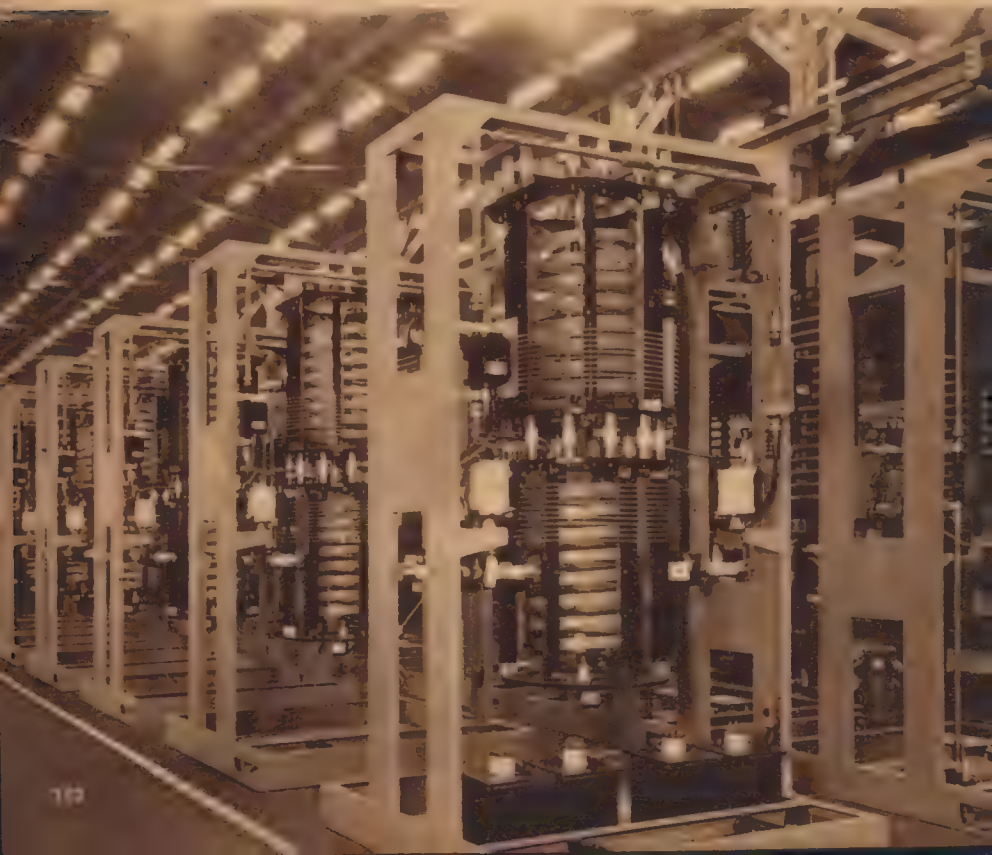
At 40,000 RPM, motor armature windings spray bits of fine-chopped copper over everything in the line of sight and cease to exist; a DC motor can, theoretically, reach that speed, but not practicably. An AC motor running on 60-cycle power doesn't have to have armature windings, and therefore can, practicably, reach the desired speed. Unfortunately, that happens to be theoretically impossible; 3600 RPM is the top speed you can reach before the motor starts trying to be a peculiarly inefficient sort of generator of 60-cycle current.

This motor solves the impasse readily enough; on 600-cycle current, 36,000 RPM is the theoretical top, and on 1000-cycle current, 60,000 RPM is the answer. It's simple enough to generate 1000-cycle current—and it has a lot of advantages beyond the super-speed AC motor it makes possible. On 1000-cycle supply, the iron field-cores and the iron required in the armature, can be far smaller. Transformers for heavy-duty equipment look like Junior's toy-train set power supply. There has been an enormous growth of equipment designed for 240, 400 and 1000-cycle power, particularly for aircraft work where the saving in dead weight ironmongery is appreciated.

• Our third item indicates that there's been an enormous growth of power equipment designed for decidedly higher frequencies, too. Radio-frequency has grown up from the status of a boy sent out with a note, the communications industry that talks in terms of watts, to that of a husky man sent to do the job of work—and the radio fre-

quency power engineer talks in terms of kilowatts. The particular job of work illustrated here is the melting of tin plate. Du Pont has evolved a system of electrolytically plating tin on sheet steel flowing through the baths at thirty miles an hour—an even coat, but dull and full of pinholes that would permit corrosion of the base metal. Westinghouse produced this, the other member of the team. As the plated steel runs through an inductance coil carrying the high-frequency power, the tin is almost instantaneously melted into a bright, perfectly protecting coat, and cooled—to prevent oxidation—equally quickly. Melting tin on the fly takes horsepower, not fly-power. Some 10,000 kilowatts of RF induction heating equipment such as this has been installed for the tin-plate job alone. Be it noted: the maximum power a broadcast transmitter may legally employ is fifty kilowatts; most stations use from one to five kilowatts, which is less power than a housewife uses in her electric range for preparing Sunday dinner.

THE END.



Beachhead for Science

by JOHN W. CAMPBELL, JR.

Concerning *the experiments of Dr. Felix Ehrenhaft—and magnetic current, a force which may give us a new means of attack on the Unknown!*

For just about a century and a half, now, science has made its greatest progress along lines where the electric current, and electric-current-inspired devices have been applicable. When Galvani and Volta turned the kick of frogs legs into the Voltaic pile and current electricity from batteries, electrical power became available. The immediate consequences spread through all branches of science; in physics, the electromagnet and electromagnetic induction followed. In chemisty, Davy's work with electric currents isolated a whole series of previously unknown substances—sodium, potassium, and other elements, and several compounds that had not been reported before. Where static electricity had been a curiosity and a thing studied mildly for itself, current electricity became a terrifically powerful lever with which to pry open the sealed locks of Nature.

For a century and a half our science has been based on the advance of knowledge electrical tools have made possible. Every important tool for atomic research has been electrical in nature, with the single—but highly important—exception of radioactive elements, chemistry's contribution.

Now, Dr. Felix Ehrenhaft has discovered phenomena which strongly suggest that magnetic current, as different from static magnetism of the magnetic field, exists. If further work bears out this belief, the importance cannot be estimated. That it will equal the importance of the electric current's contribution is a fair guess—but, more important, it will serve as a second beachhead for science's attack on the unknown. It will, so

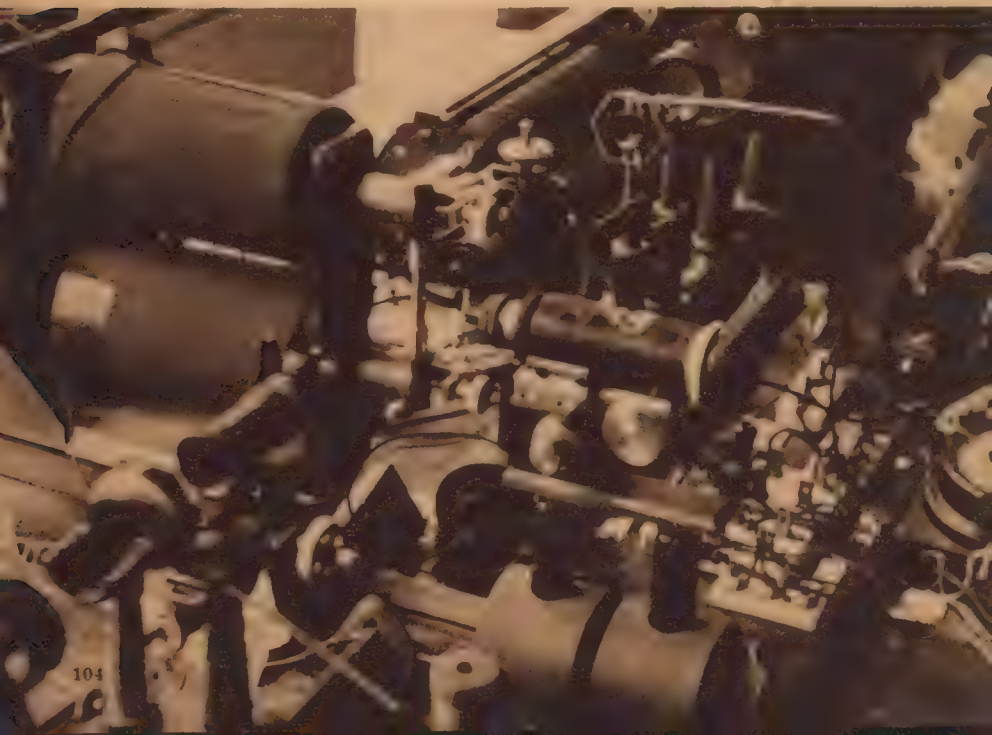
to speak, make possible pincers attacks on the fundamental problems. Where attacks based on electrical knowledge and carried out with electrical means have been blocked, methods based on purely magnetic methods may change the whole picture. One outstanding possibility is that a simultaneous manipulation of magnetic and electric factors may make possible some real understanding of the third—and greatest—member of the triad of known force-fields; gravity.

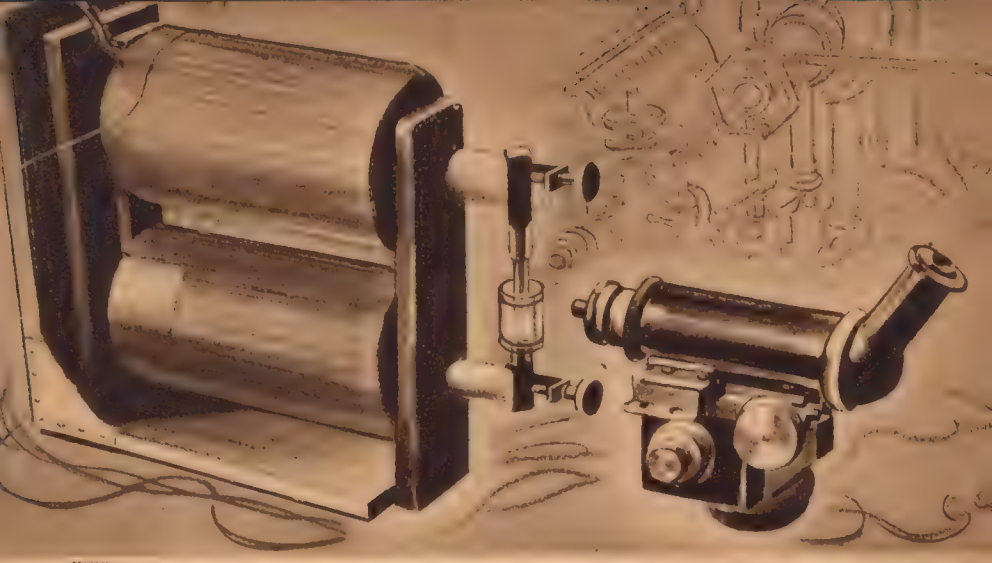
Dr. Ehrenhaft, head of the Physics Department of Vienna University until the Nazis took Austria, has been working on the problems of magnetic and electric fields and charged particles for many years. Shortly before Millikan's work on the charge on the electron was published, Dr. Ehrenhaft had developed similar methods, and attacked the problem. Unlike Millikan, Dr. Ehrenhaft worked with exceedingly small particles, so small that several had to be lined up by micro-manipulation before the end-to-end diameters added up enough to be measured. The individual particles, being smaller than a wave length of light, could not be measured before the days of the electron microscope.

The results Dr. Ehrenhaft got

Dr. Ehrenhaft's apparatus is essentially extremely simple, of the home-laboratory order, in fact. Here, the photograph shows a confusion of fine optical and illuminating equipment, stray wires, and confusion. . . .

Campbell





Kolliker

. . . which, when the artist strips away the nonessentials, reveals an electromagnet, a microscope, and an experimental cell between the poles.

differed from Millikan's, too; Dr. Ehrenhaft's calculations on the behavior of his genuinely submicroscopic particles of various materials indicated various charges *smaller* than the values Millikan had found as the charge on a single electron.

The method of measurement of such charges involves an extremely complex series of calculations and determinations involving the viscosity of air, the diameter of the particles, their density, and a great number of other quantities. An error anywhere along the line can vitiate the final result. Dr. Ehrenhaft's results were not widely accepted, perhaps partly because he did not give any definite value as the least possible charge, partly because the value Millikan found yielded pragmatically useful results in many other physical calculations. (If the figure determined by Millikan, and generally accepted as the charge on a single electron, were actually ten times or twenty-one times or some other multiple of the true value, but represented some "preferred aggregate" charge, a sort of electron-tribal-unit, the same pragmatic results might be obtained.)

Dr. Ehrenhaft has continued with his investigation of minute electric and magnetic charges whenever possible—time for experimentation is limited when directing a major University department—since that time. Since coming to the United States, he has done considerable work, and, in particular, became interested in magnetic results obtained.

The last word on magnetic

phenomena was, remarkably, some seven centuries old. Peregrinus had performed the classic experiments in the Thirteenth Century: floating a bar magnet on a cork in a basin of water, and breaking a magnet into small pieces. The floating magnet aligned itself in Earth's magnetic field, but did not travel either north or south, nor did any small piece of his broken magnet travel either north or south. From this he concluded that in a uniform magnetic field, a magnet would show two opposite, but always equal, polarities, but could not move. Of course, in the highly nonuniform, locally concentrated field of an ordinary-sized magnet, the north pole of another magnet will be appreciably nearer than the south pole, and, the inverse square law of attraction being what it is, there will be travel, not merely alignment.

Ehrenhaft, working with his extremely small particles, got some results that did not seem to check with that doctrine. With that as a start, logic suggests an hypothesis which can be tested.

If, in very small particles, inequalities of magnetic polarity are possible, then unit charges of mag-

The magnetolysis experimental set-up is equally simple. Here, a powerful semicircular alnico permanent magnet energizes the soft iron magnetodes thrust through rubber grommets into the U-tube so that the gas bubbles from each pole may be collected separately for subsequent analysis.

Campbell

netic polarity, corresponding to unit charges of electrical polarity, must exist. If they exist, they must be highly mobile. (It's evidently extremely difficult to get one type away without an equal number of the opposite sneaking along. But moving magnetic charges—free magnetic poles—would constitute a magnetic *current*. And the properties of a magnetic current—?

Curiously, electrical engineers and physicists have, for years, calculated the properties of free magnetic poles—north pole charges, without south pole accompaniment—and of magnetic currents, flowing magnetism, as well as the properties of magnetic fields. It was long recognized as a mathematico-physical simplification to consider that free north poles did exist, and calculate the behavior of such poles under the conditions laid down in the problem. Electrical engineering data were so calculated—always with the accompanying denial of the reality of the free north pole. Other engineering and physical problems were solved—meaning, naturally, that they got the answers that agreed with the facts!—by assuming the existence of a magnetic current, purely as a means of simplifying the mathematical processes of attacking the problem. And, of course, denying the reality of that current.

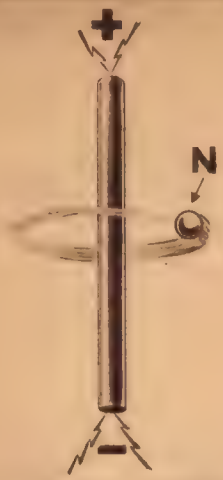
There was, then, a fairly complete body of knowledge on the behavior of free poles, and the properties of a magnetic current. The magnetic current corresponds to the electric current as the magnetic field corresponds to the electric. Intensity of magnetization corresponds to electric potential. The definition of a unit magnetic pole is identical with the definition of a unit electric charge, save for the change of name. (It assumes the existence of free north poles for the purpose of definition.)

In electrical engineering, one of the most important properties of the interrelationship of electric and magnetic fields is that a free north pole will go into rotation about an electric current. The converse—an electric charge must go into rotation about a magnetic current—should apply. That was a point it might be possible to check.

One of the outstanding properties of electric current is, of course, its ability to perform work of various kinds—chemical, mechanical, thermal, and many others. The magnetic current should have similar characteristics. Can we check?

In current electricity, potential exists only where there is some type of impedance to the flow of the current, such as resistance. Static electric potentials can be instantly turned into current electricity, save in the peculiar case of permanent electrets. One of the easiest ways to detect an electric potential is by the attraction it exerts on oppositely charged bodies.

Magnets attract oppositely charged poles—but you can't discharge the magnetic charge on a magnet. There is a fundamental difference right there. Or—is there? You can drown a permanent electret—made by melting carnauba

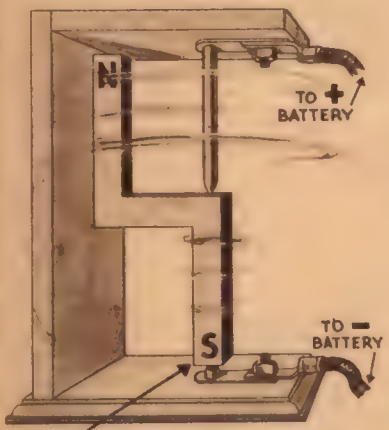


STANDARD THEORY:

A free magnetic pole (charge) will rotate around a constant electric current.

. . .

STANDARD DEMONSTRATION:



ROTATION OF THIS POLE WOULD ORDINARILY TEND TO BE IN OPPOSITE DIRECTION. SINCE CURRENT FLOWS THROUGH IT, NO TORQUE IS DEVELOPED.

STANDARD THEORY:

And a free electric charge will rotate around a constant magnetic current. (Distinct from A.C. magnetic field effects.)

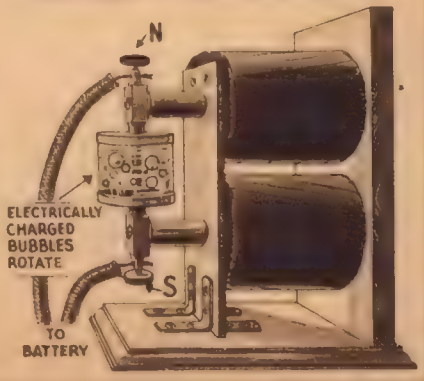
. . .

STANDARD DEMONSTRATION:

None. Here-to-fore believed a useful mathematical device for calculations, but not to exist in nature.

. . .

EHRENHAFT'S DEMONSTRATION:



wax and rosin, and allowing them to cool between the highly charged plates of a condenser—in the highly conductive liquid, mercury, and yet the charge is not dissipated. An electromagnet, on the other hand, dissipates its charge instantly when the current is cut off.

But the magnetic current doesn't heat things, if it exists!

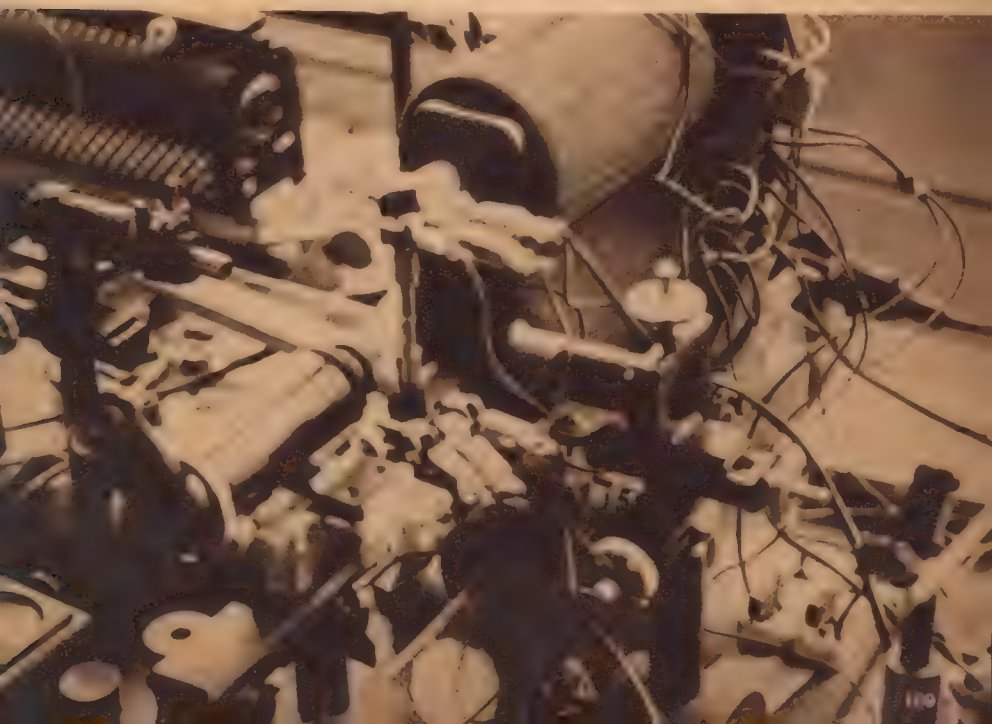
Well—let's try those possible check experiments first.

Dr. Ehrenhaft set up an electromagnet, with soft iron pole pieces dipping into dilute sulphuric acid, electrically insulated from the iron magnet core. When a little electric current was applied, the dilute acid was, of course, electrolyzed, and streams of bubbles rose from the poles. These bubbles, naturally, were electrically charged; the poles from which they evolved were charged. If the magnetic current existed, and if it could be made to flow from pole to pole through the acid solution, then the bubbles should, on the basis of theory, go into rotation around the unseen magnetic current.

When the electromagnet was turned on, the rising bubbles instantly and violently twisted into a rapid rotation—rapid and violent enough to be far beyond any ques-

A profusion of electrical connections to the magnetodes of the electromagnet permits switches to short-circuit them or charge them electrically.

Campbell



tion of accidental eddies of liquid, convection or anything else. Those bubbles *move!* Reversing the magnetic current stops the rotation, then starts it equally rapidly in the opposite direction. The rotation is powerful enough to get the mass of liquid rotating very markedly; it takes a moment to overcome that inertia and reverse the flow. The rotation continues steadily so long as the current flows. The magnet is excited by direct current, and the rotation is *not* a transient phenomenon—there is a steady, continuous driving urge present. I have seen the experiment performed, and *know* those bubbles, under the named conditions of the electromagnet and electrolyzing current, do, in fact, go into a flat, very rapid, horizontal rotation.

Something is driving them; I can not, myself, see any adequate explanation for the clearly visible action on the basis of classical theory. I believe that Dr. Ehrenhaft's experiment proves the existence of the magnetic current.

That is Critical Experiment No. 1; electrically charged particles do rotate about the space where a magnetic current should be, if magnetic current exists—as theory predicts.

Electrically charged particles do *not* rotate detectably, however, around the gap between the poles of a permanent magnet. Why—?

The permanent magnet represents *stored* magnetic energy—static magnetic field energy, pretty solidly tied down, just as the bound, stored electric field energy of a permanent electret is. The permanent magnet does not, therefore, have a magnetic current associated with it. The observed lack of rotation, then, conforms with theory.

If magnetic current exists, its flow should be capable of doing work. (If it won't, it's of little practical use, certainly. And pure theory requires that it should, in any case.) When an electric current of any magnitude flows, there are hundreds of ways to detect it, quite aside from the electromagnetic methods used in galvanometers, ammeters, and the like. It heats wires. The standard of definition for an ampere is based on the fact that an electric current will deposit metallic silver from a solution of silver nitrate, doing chemical work in the process.

Of course, the magnetic current is doing work in that experiment which makes the bubbles—and the solution—rotate. The energy of rotation must come from the magnetic current. But in all the many years of work with electromagnets, no one has detected any heating of the iron core by the flow of magnetic current. No one has reported a magnetolysis effect corresponding to electrolysis. If the current is flowing, why hasn't this evidence of work been observed?

On the lack of heating effects, there are several possible explanations, all, basically, rooted in the fact that we don't know anything at all about magnetic conductors and nonconductors. We don't know what the unit of magnetic

Olga Ley

Dr. and Mrs. Felix Ehrenhaft being interviewed in the laboratory. The interviewer, not unknown to Astounding Science Fiction, *is Willy Ley.*

charge is—the magneton, let's call it—nor the properties of this magneton. However, there is a somewhat parallel case in electrical current phenomena that can legitimately be advanced as a possibility. Suppose a race of intelligent beings somehow managed to evolve on a planet 20,000,000,000 miles from the Sun, where "room temperature" was about half a degree absolute. Any member of that race reporting the existence of electric current would have some difficulty proving that it was capable of causing heating effects—for, at that temperature, a very large proportion of metallic conductors are superconductors, with no readily detectable resistance!

We don't know what electrical superconductivity is, nor why it is—about all we know is that it exists, and is manifest only at temperatures near absolute zero. We do not know that all the phenomena

of electrical superconductivity are necessarily and inevitably correlated. There is not sufficient knowledge of electrical superconductivity, nor, certainly, of magnetic current phenomena, to make it possible to say that superconductivity-type resistance action does not take place in magnetic current circuits.

The lack of observation of magnetic current doing chemical work is, apparently, just that—lack of observation. Dr. Ehrenhaft can show that action in several ways.

First, with the same electromagnet set-up used in the rotating-charges experiment, the two magnetodes can be electrically short-circuited, tied together with a piece of copper wire, thus making electrolysis impossible. The observations are made with a low-power microscope focused on the soft iron magnetodes. With no magnetization, using dilute sulphuric acid solution between the pole-pieces, there is a natural slow evolution of hydrogen bubbles, by simple chemical replacement—$Fe + H_2SO_4 \longrightarrow FeSO_4 + H_2$. Since this action is a strongly reducing action, no free oxygen would be evolved.

When the magnetic field is applied, there is a noticeable acceleration of gas evolution. If the process is continued for some time, and the gas evolved collected, some two to twelve percent of oxygen is present. Chemical action would not yield oxygen; some additional process is present which is breaking down the water to its elements.

Furthermore, when the magnetic field is broken, the magnetic current cut off, the theory of magnetic current would suggest that, as electrolysis yields electrically charged gas bubbles, some of these magnetolysis bubbles should be magnetically charged. They certainly appear to be. When the magnet is turned off, a burst of fine bubbles starts to rise by buoyancy, from the lower magnetode. If the magnet is immediately snapped on again before the bubbles have entirely escaped, some can be dragged downward, against buoyancy, to the magnetically charged pole.

Critical Experiment #2 yields the result, then, that the magnetic current can, apparently, do chemical work.

The experiment which seems to be most disturbing to physicists and engineers, however, is the simplest, most readily performed, of all. It involves only a permanent magnet, some means to measure the pole strength, and a glass of dilute acid.

The charge on a permanent electret cannot be short-circuited off—but it can be released by a number of methods, such as heating the wax and rosin mixture so that the molecules are free to move again. (A permanent magnet loses magnetism when heated enough to loosen the intermolecular bonds a bit, too.) There are a number of other ways of releasing the electret's charge.

Dr. Ehrenhaft has shown that the magnetic charge of a permanent magnet can be released by making it do chemical work. If the magnet is put in dilute acid, the slow

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The great-granddaddy of alnico magnets. This super-potent permanent magnet was awaiting tests in the magnetolysis apparatus at the moment. It was hoped that sufficient gas would be released to permit determinations of the quantitative relationships—if any—between pole-strength loss and gas evolution—the magnetic equivalent of Ampere's experiment.

evolution of hydrogen, by ordinary chemical reaction, begins—but oxygen appears in the evolved gas, also. Chemical action should not produce it. More important, the pole strength of the permanent magnet declines markedly in a period of a few days, though the magnet is not appreciably eaten away by the acid.

The pole strength of a good alnico magnet, once set up in an experimental arrangement, does not decline to any important extent during a period of many months. (There is an immediate loss of pole strength when the keeper is first removed, and various manipulations in the course of setting up apparatus may cause appreciable fluctuations, though not extreme changes.) Dr. Ehrenhaft has set up an alnico magnet, and drained the pole strength by approximately ten percent in sixty hours in one case, and, with another magnet, the same pole-strength reduction was

accomplished in twenty-four hours. The variation in time appears to have been due to a shorter liquid gap between the magnetodes in the second case.

Adequate apparatus helps, naturally, but a satisfactory means of measuring the magnet's pole strength—for the qualitative determination of whether or not an effect is secured—can be contrived in many ways. A bismuth-wire coil, wheatstone bridge and galvanometer, jump-coil, or other laboratory devices are unnecessary; a series of ball bearings, a measurement of the distance the magnet can lift a small keeper against gravity, or many other tests will do nicely.

Dr. Ehrenhaft's experiments have all, so far, been extremely simple; they have had to be. In Faraday's day, one of the great mysteries of electric current—batteries being the only source of current at that time—was the peculiar and seemingly inexplicable fact that a cell made with huge copper and zinc plates four feet square, could heat a wire red hot, or even blow out a small wire, yet would not electrolyze fused sodium hydroxide. Yet two or three very small cells, with little one-inch-square copper and zinc plates would electrolyze fused caustic, but wouldn't heat the wire. It was a good many years before the essential difference between voltage and amperage was understood. Over a century of research stands behind us now; we know something about electric current.

We know, for instance, that metals are conductors, nonmetals are nonconductors. Ionizable solutions conduct, certain types of solid compounds—particularly oxides and sulphides—conduct. It's a generally trustworthy rule that transparent solids will not conduct. (Which is a nuisance; you can't make an electrically heated—and hence frost-free—window.)

But we haven't the faintest idea of the simplest rules of magnetic current conductivity. What constitutes a conductor? What can we use for insulation?

We don't know the basic laws of magnetic currents themselves, either. Kirchoff's Law of electric current states that the sum of the currents flowing to a point in an electrical network equals the sum of the currents flowing from that point. Obviously necessary and true—provided, of course, you don't try to call a transformer a "point." That, of course, may have some curious results. And, too, you'd have driven Kirchoff crazy if you'd given him a radio-frequency ammeter, and suggested he check on the to-and-away-from currents involved in a radio antenna, without explaining what radio frequency currents did. A good, solid twenty amperes going in—nothing at all coming out!

But we can't begin to learn the properties of magnetic currents, until we can devise magneto-galvanometers, magnammeters, and other magnetic instruments. We can't design those, however, till we know what constitutes a magnetic current insulator.

Incidentally, a magnetic current insulator does *not* have to stop a magnetic field; the two are completely different items. Polystyrene is a wonderful electric insulator, widely used because it has so little effect on an electric *field*.

Dr. Ehrenhaft has been using iron as his magnetic conductor. All we can say for certain is that iron is *not* a really good magnetic conductor. The Faraday Cage, consisting simply of close-spaced, grounded wires, will completely exclude an electric field. Copper wires being excellent conductors of electricity, there will be no effective potential between two sides of a copper wire —they'll both be at ground potential. No magnetic equivalent of the Faraday Cage has been found yet, and certainly iron will not serve.

The whole field of magnetic current research is wide open; there are countless basic discoveries of the most rudimentary—and, therefore, vastly important—nature to be made. There are, in consequence, countless basic industrial patents to be taken out. It would be rather lucrative, for instance, if one had a basic patent covering the transformer principle, the electric motor, and the electric dynamo—as Faraday could have when electric current was new!

Only two months ago, we ran George Smith's article showing how the advance of radio technology from home workshop and fundamental discovery stage to laboratory development and precision instrument stage has taken radio out of the hands of Garret Genius. Magnetic current is today in a stage comparable to the time when Hertz had discovered radio waves, and before Marconi sewed up the first basic patents.

Among the basic patents promised by magnetic current knowledge will be the long-sought direct current transformer. (Take the six volt, perfectly pure direct current of a storage battery and transform it into equally pure direct current at 300 volts. No buzzer-transformer-rectifier-filter system can give really pure DC. Power cannot be practicably generated at 100,000 volts, and 10,000 volts of DC cannot be transformed, now, to 100,000 or 500,000 for long-distance shipment.)

Another patent may be a mag-

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netic motor, a real, purely magnetic motor. The so-called electric motor is actually a magnetic motor, operated by magnetic potentials—fields—generated at the motor itself. That involves a lot of waste motion in the form of coils, ironware, commutators, and what-not. If you could ship magnetic current at a reasonable potential cross-country, your magnetic motor would consist of no more than a few magnetic plates and a commutator; perhaps the commutator could be eliminated by proper design.

Curiously, the magnetic current equivalent of a resonant circuit would look exactly like the electric current device! At present we use a coil of electric conductor in which the flowing current can build up magnetic field energy, and a condenser of separated conductive plates in which electric field energy can build up. The same structures, made of magnetic conductors and magnetic insulators, will also resonate—but now the magnetic field appears in the condenser, and the electric field in the coil.

Until we know what a magneton is, and how it behaves, we can't build magnetonic amplifier tubes, but for every present electrical device there should be a magnetic equivalent. More important, for many impractical electric devices, there may well be practicable magnetic mechanisms. (That works in reverse, of course; it may be possible to design a magnetic equivalent of a given electric device, but in many cases it will probably work out that the thing can't be built.) The magnetic motor is an example. Present electromagnetic motors turn because of the attraction between unlike magnetic charges, potentials, and the repulsion between like magnetic potentials.

Some years back, a true electric motor was built. It developed half a horsepower or so, operated at 5,000,000 volts DC, and occupied a large room completely. It worked, but it was darned impractical. You can't make powerful electric potentials behave at all in any reasonably small space. Magnetic charges with mutual attraction forces equivalent to the electric attractive forces of potentials of millions and tens of millions of volts can be brought into small, practicable machines. What difference of electric potential would be needed, for instance, to make electrostatic attraction lift two tons of scrap steel against the force of gravity from a distance of eighteen inches? And how many hundred feet apart would you actually have to keep those potentials to prevent arcing? But a lifting magnet for the job is simple.

But perhaps a magnetoelectret—consisting of a coil of magnetic conductor carrying a heavy magnetic current—would develop electric potentials that didn't tend to arc across? Perhaps a small magnetic coil would develop 50,000,000 volt potentials that could tear atoms apart?

Of course, atomic theory will have to be resurveyed completely if Ehrenhaft is right on his magnetic current work. (That is what

he set out to prove, remember—but on the basis that his values for the fundamental electric charge, not Millikan's, were correct. The magnetic discovery was incidental. If Ehrenhaft's electric charge figures are completely meaningless, they will still represent a thing of immense importance to mankind if they have driven him to the discovery of magnetic current!) Resurveyal of atomic theory is nothing new; it has been done with great regularity about once every five years since 1890. Recently, they've discovered neutrons and positrons in the atom. Because their figures would not balance properly, they have been forced to postulate a neutrino, a chargeless particle of electron mass. Maybe the neutrino is misnamed and misunderstood; perhaps it should be called a magneton—which wouldn't have an *electric* charge.

Since magnetic current seems to be able to do chemical work, the converse would probably be true; chemical work can be transformed into magnetic current, if the right reactions are found. Ehrenhaft has, to date, used sulphuric acid solutions—for no particular reason, probably, save that it did seem to work to some degree. Sulphuric acid is a very fine electrolyte, but there's no suggestion of evidence that it is a particularly good magnetolyte. True, the charge of a permanent magnet will drain off through it, but the charge on a condenser will drain off through oil, oil specially selected as being the worst electrical conductor procurable, given a reasonable amount of time. We may eventually find that, oh, say gadolinium lauryl sulphonate dissolved in diphenyl ether is a really good magnetolyte. Or sodium dissolved in liquid ammonia. It's the same problem—what constitutes a magnetic conductor?

Maybe nerve tissue is. There are feeble electrical effects in nerve currents, but we know they are not electric currents. They may be magnetic currents. Perhaps a lot of the secrets of psychology and medicine will be a lot clearer when we can clamp on some magnetodes, and hitch them to a magnetonic amplifier and recording stylus.

But if Ehrenhaft's work is right—if magnetic currents exist—one point, long the basic point of science-fiction, is certainly and clearly demonstrated: "we don't know nothin' from nowhars!" But during the next two decades, with all the power of modern scientific methodology, with the two-pronged pincers attack from both the magnetic and the electric front, we may learn something!

THE END.

Look for ASTOUNDING

The Second Tuesday of Each Month.

House of Tomorrow

by ROBY WENTZ

It was a very ancient building, and an even more ancient crypt far below it. But there was a boat there—a ship that sailed through time with a cargo of misery, terror and destruction—

Illustrated by Orban

The one surtitled Helt Heyn Vorberk, Great Prober of the Past, settled the dust-filter over his highbred features and commanded: "Break it down."

The underprobers turned the ray against the heavy wall of old, earth-darkened stone. One stood at the controls and energized them. A gentle, dryish buzzing swelled and rose; presently the stones dripped and ran, puddling in smoking pools at the bottom of the diggings. A section of the wall

collapsed; simultaneously, clouds of dust rose in the violated chamber.

The Vorberk stepped into the opening, and the dust settled as it came into contact with his person. Clearing, it revealed an extensive chamber. The quick eyes of the prober took it in—the two contorted skeletons of men on the paved stone floor, lying some distance apart, the opening in some sort of shattered stonework at the far end of the place, appearing to lead into what had once been a corridor or passageway—now blocked with fallen debris.

Then he saw the brownish object among one of the contorted sets of bones. As he bent and gently lifted it from among them, he noted the strange absence of the right forearm bone. The thing was a book of the ancient sort, bound in crackling animal-hide that crumbled in spots at his touch. He handed it to an underprober. "Place it in the preservative. Then I will inspect it in my workrooms."

Outside translucent walls, the night swirled and sparkled with a myriad lights in a hundred hues from horizon to zenith, but the Vorberk gazed thoughtfully at the frail pages of the antique book. Interesting! The handwriting was firm and strong—save at the very close of the record—and here, without question, lay the solution to a minor mystery which occasionally puzzled historians studying that portion of their field called, in the old chronology the "twentieth century." Then a sudden thought came; he sat straight a moment, then turned back to reread the faded script:

The news today is still worse. They tell us this or that—the enemy will tire, we will negotiate a peace, soon. Fine comfort for we of Munich who have been under constant air blitz for ten days. We know that armies wait across the Rhine, and in the East, only God knows what the terrible Russians may do this spring. No matter how they try to hide it from us, it is the beginning of the end.

At the last moment, whenever it may come, where will our leaders go? They will not stay. They could not stay. They will have some escape, but we, the German people, will have none.

I do not know why they make any effort to maintain school here. The unceasing blitz has made conditions impossible. The boys roam at will. Which reminds me of the extraordinary tale one of my students brought me last night. He is Hans Schmidt. Poor youngster, he has a withered arm, his reason for being in this school for "inferior" youth—those not fit to join the Hitler Youth. He seems a very imaginative lad. His passion is the Middle Ages; he has read everything on it our poor books can offer. Apparently, this old rat's nest to which we were moved after being bombed out of the *Waldenstrasse* last month is made to his order. By his account he has been doing a bit of exploring below-stairs. It seems he has found somewhere "a secret

passage, Herr Professor, just as in the books!" Also he babbled something about "a boat," whatever that might mean.

This building is as old as any in Munich, and of course our people have not had time yet in which to examine it. It would date easily from the thirteenth century. It is part of a great block of similar rookeries, and the whole district is known as *der Morgenhaus*, a rather strange name, said to have belonged to an ancient monastery hereabouts. Quite possibly there are some interesting rabbit-runs underneath us, even deeper than the one we use for an air-raid shelter.

I like Schmidt, and I am afraid his explorations may get him into some trouble. The best policy in such cases is to demand to see what there is to see, and thus boil a tall tale down to its grain of fact. And since we cannot leave here, by order of the headmaster, I may ask Schmidt to show me his "secret passage."

May 21st. I went with Schmidt last night. The results of the tour certainly were not commonplace. No question, the lad has stumbled upon something. But what? In any event, since this record is for myself alone, and will never be seen by another, I will set down what happened.

The boy was highly pleased at my suggestion he take me to see what he had found. An alarm sounded just as we started and it was no trouble at all to evade notice of our going. Schmidt produced a length of candle; I soon learned how important it was.

He went past the kitchens, down a short flight of stairs into a kind of storage room for supplies, through another door, and down more stairs into an equivalent room just below it. Here a near bomb-hit had blown out a bit of wall, making a heap of rubble in one corner. We climbed over it; and I saw that the blast had, in one of those freak actions, apparently removed with neatness the old stones of a blocked-up door. Through it we went, the boy leading confidently on into still another room, long and narrow, echoing to our steps. I caught glimpses of curious stonework I should like to have examined, but Schmidt was pushing on down the gloomy gallery. At its far end there was a small door of badly-rotted, worm-eaten wood, with a pointed-top, and traces of carving. I was wondering how long these rooms had lain untouched. The fittings were completely medieval, and there was heavy dust underfoot like a cushion. But Schmidt boldly wrenched the door wide on screaming hinges; there lay the head of a flight of spiral stairs, leading steeply down.

I felt cautiously for footholds on the steep flight. I noticed the stones alongside beginning to be dampish. After about three spirals down, we suddenly debouched into a passage, about ten meters long—a cul-de-sac, without exit. Schmidt, chuckling like a little monkey, plucked at my sleeve and held the candle high. There on the wall, at

about shoulder-height, hung a rust-eaten iron ring; standing tiptoe, Schmidt reached for the ring with his good arm, and pulled it. "See, Herr Professor!" His triumphant cry rang weirdly in the vaultlike confines of the passage.

A huge chunk of stone, in which the ring was set, was turning, evidently on delicate balances, with surprisingly little noise, sliding its bulk out into the passage, completely blocking it, but opening a new aperture in the wall from thigh- to shoulder-height!

It was amply large to admit me, and I had no excuse for not following little Schmidt, who was already through it, however little I might like the idea. I had not expected this kind of ramble, at all. If we were lost, we were lost for all time; no one else had come this way in centuries. On that I will stake my life. We were walking in forgotten ways. I hastened after Schmidt, with the sudden thought that nothing must happen to him; without him we might never emerge from this labyrinth of cellars.

The new passage beyond the open stone was very narrow, and sloped slightly downward. I must have followed Schmidt along it for two hundred meters. Suddenly, he disappeared. I cried out in alarm—then realized he had turned a right-angled corner to the left. I followed quickly, and found myself in a great room.

Schmidt's cry "Here it is, Herr Professor!" showed that we had at least reached the end of this subterranean trek. I took the candle from him and held it high; far above, I dimly made out a vaulted ceiling, heavily groined in the manner common to medieval church and monastery architecture. Evidently, this was a crypt of sorts. But of what depth!

I held the candle at arm's length, and peered about. I could see nothing, only the walls fading into darkness on either side. Schmidt had been tugging at my sleeve all this time.

"Look, Herr Professor," he begged, now, "*it* is there, just as I said."

At first I saw nothing where he pointed in the gloom. Then, moving in the direction, I caught my first sight of it. I made out the lines of the hull first, then forgot them for the moment as the candle-gleams touched the surfaces and flamed back in mirrored beauty from the brilliant surfaces of the most exquisitely fashioned sculpture or artifact of an inanimate object I have ever seen.

It was a ship, or rather boat, yet modeled with the antique lines of an ancient galley, about the length and size of a modern canoe. What it was made from, I cannot tell: a lifetime as a teacher of physical science gives me no clue to the metal—if it was metal—of the object. It was silvery-smooth, more polished than the aluminum of an airplane wing, yet with an indescribable quality of *depth*—as though one were gazing into water of incredible clarity.

Certainly it had none of the qual-

ity of age one would expect of anything found in that forgotten place. It was as new and shining as though turned out of some super-factory the day before.

I began to examine the thing more closely; it was all of a piece. No sign of welding, no such thing as a rivet, marred it.

"Is it not beautiful, Herr Professor?" Schmidt's childish tones echoed startingly among the roof-recesses, grotesquely out-of-place in *this* place. "What is it doing here?"

I shook my head. The boy's confidence that I, his teacher, had the answer to this wonder, mocked my own awed ignorance—and something more, a tiny thread of fear. What *was* it doing there? I laid a hand to the craft's bulwark. The metal was cold, satiny-smooth. Then I saw a strange thing.

Like any boat, this one had a rudder—but the rudder was *inside the craft.* In shape it was a rudder, but instead of being *outside,* with its blade extending away from the bow, this one was *inside,* and extended toward the bow. Nor was it a solid instrument, for thrusting aside water. This rudder was a framework, I might say, a grid of wires, looking very much like copper. My eye followed the lines up to a tiller-handle of the same stuff. This, however, was solid. It was a true handle, could be gripped by a hand. But directly under it was another unlikely fixture. This was, simply, a quadrant.

Not only that—it was a calibrated quadrant. By calibrated I mean that, leaning down and holding the candle close, I saw clearly how the copper (?) of the arc had been deeply abraded here and there, as though by a file. The inference of this was plain. The tiller-handle was intended to move around the arc of the quadrant; their surfaces were close against one another. And this being so, the filed-out "calibrations" would form natural stopping-points. But why? What possible use would this fantastically-equipped craft have, rudder-reversed, and all?

I bent down close to the coppery wires of the rudder, trying to see it more closely. For a moment, my head was completely within the circumference of the craft's bulwarks, and below their level. Suddenly, it seemed that voices were dinning in my ears! There were men's voices, raised and angry, seeming to come from far away, like voices heard in the open on a quiet summer's night. So startled was I that I raised up, thinking someone was coming, and the sounds were gone.

Once more I stuck my head down into the vessel. The sounds were there again; fainter now, and I could hear but one voice; then, suddenly, there came a burst of music. The volume was infinitesimal, but perfect, like an image seen through the small end of a telescope; almost immediately it was drowned out by something that was like an earthquake in an iron foundry; then the voices again—

I straightened up from the interior of the "boat" like one waking from a dream. Then I saw Schmidt's wide eyes, staring at me.

The candle-lit gloom, the silence, the tomblike oppressions of the place, the strange, beautiful ship and its awesome properties evoked sudden panic. The next thing I remember is having seized little Schmidt by the shoulder, hustling him toward what I thought was the entrance to the run by which we had come into this place, only to bring up against a solid wall of masonry! We were in an archway, true; it was an arch with the pointed top, of the usual type, but it was blocked. There was no exit, now. We were walled up in this place.

It was little Schmidt, calmly tugging at my hand, who quietly indicated the other archway far across the chamber; I had, in my panic, run the wrong way! I hurried past the boat without looking at it again. The journey back to the upper world, exhausting as it was, seemed to pass in a blur.

Now I sit here, in this cubicle that is my own, writing of all this, and I have only just remembered one other thing; when in my frightened haste I brought up hard against the barrier in the false archway, I made mental note of something that has only now come to the top of my consciousness.

That masonry wall blocking the other entrance (?) into the chamber of the ship was modern. It was of brick, of excellent workmanship; I remember well feeling the sharp, smooth edges of new bricks. It

must have been put there in quite recent times.

May 24th. Three more days of this blitz. Apparently, there are other parts of the town on which they are working first; they have not reached us yet. Bit by bit, they are destroying the city, and we know that other cities are now taking the same punishment. We have given up all pretense of trying to keep school. Some of us still live on here; we have no place else to go.

I have had plenty of time to ponder the thing I wrote into this book three days ago, therefore. I find it taking on a dreamlike quality. That is nonsense, for I am not weak-minded enough to try to convince myself that it was all a "vision" or a "hallucination." I am a man of science, and I know that what I saw, I saw. I felt, and I heard. Down beneath us there is a thing which defies explanation.

So, I have had a decision to make. There are two courses open (a) I can do nothing about it or (b) I can do something about it. I find I am not the do-nothing type. To begin, I have been able to learn a little about this building and the surrounding area. I was right about it being known as *der Morgenhaus,* though no one knows why. It does date from the thirteenth century—perhaps earlier.

This brings up the question of the second entrance to the crypt. The masonry, as I have written, was *modern.* The men who made that underground chamber did not erect those bricks in the barrier under the pointed archway. *Who did?*

This takes us a step further. Whoever laid the courses of that brick knew about the metal ship, knew of its presence in the chamber.

Did they know anything else about it?

Again, why was the entrance walled up, and why was not the other archway walled? It has occurred to me that "they," whoever they were, did not possess the secret of the turning stone. Could it be that the stone is turned only from the side of the iron ring in the wall? If so, had they explored that long passage, they would have encountered simply a blank, solid wall at its end.

I have already questioned Schmidt. To him, the whole affair is living romance. He has bombarded me with questions; I have asked him a few; the whole business of how he happened to get into the maze of passageways and finally down into the ship's chamber is apparently the story of a tireless boy's tireless curiosity. It was curiosity led him to pull on the iron ring.

But it is the "ship" that is the greatest mystery, after all. The voices—but I refuse to think about that. That I cannot explain; that, perhaps, was a trick of my bomb-blasted eardrums. It is the odd tiller-and-rudder arrangement, the quadrant and the "calibration" marks on it; those did not get there by themselves; they were put there, intentionally; they *mean something.*

And by the same token, the "ship" means something. There is some purpose—*was* some purpose in its creation, by whom or by what, God knows.

And what purpose?

I am going down into the crypt again. I am going to move that tiller around the arc of its quadrant. Someone else did it; those markings, deeply cut as they are, prove that. It may be that something in the process will give me a further clue to the nature of things.

Another alarm is sounding, the third today. The thuds of the explosions seem to be moving gradually closer to us here. Can it be that they are destroying a city slowly, systematically, section by section?

I must find Schmidt, and tell him I am going down again. I will need him to guide me.

I hope that when we return aboveground, this room will still be here whole, and this book will still remain to be written in.

May 26th. Two days have passed since last I set an entry here. As I write now, I think how strange, that these dull, flat pages of plain, blue-ruled paper should be the sole bearers, save myself, of the secret which would set afire every capital on earth, every foreign office, every war department.

The plans are now in motion. For the present, there is nothing to do but wait. But one day, and soon, there will be the tale to tell, and then these dumb pages will speak out and tell how a little lad with a crippled arm ended the most brutal and cruel war of all time and brought about the downfall of its creators.

Two nights ago, Schmidt and I traversed again the deepening ways of the path to the chamber of the ship, crawled into the aperture when the stone swung wide to admit us, and stood once more in the crypt.

All was exactly as we had left it three nights earlier, even to our footprints in the dust of the stone floor. The shining artifact stood there, beautiful and enigmatic as before. The candlelight swam in the depths of its mirrored surfaces.

It was determined first to observe the movements of the tiller-handle around the quadrant; I had certain other tests in mind, also, but the desire in me to feel that handle slide over the smooth metal of the arc, to feel the touches of the cut-out markings as it passed each one of them, was almost like a hunger in me. I cannot explain such an urge. I moved to the side of the craft, whose bulwarks reached halfway up my thigh, and stood looking down at the curious arrangement of "rudder" and tiller.

I had forgotten Schmidt for the moment. He was flitting about, probably under the most intense excitement, although I took no notice of him. I was about to place myself at the stern of the vessel, where I could manipulate the tiller, when, with a cry which sounded something like "Steer the ship!" the boy sprang right into the thing, seized the tiller himself, and swung it across the quadrant.

I saw that the gridlike rudder swung with the handle's movement. Suddenly, it was as though a great company of people were concealed inside the shallow sides of that gleaming hull. A sound welled up as of all the inhabitants of the earth adding their voices to a huge cacophony of humanity. That is precisely what I recall thinking, but it came to me only later.

I remember Schmidt's suddenly terrified cry of "Herr Professor, I am afraid, afraid—" as the great sound swelled around him.

Then he was gone, and the sound of voices with him.

The mirrored ship had vanished, taking him with it.

There had been a little puff of air. as when a door is opened into a room; the candle flared a bit, and that was all. The entire thing must not have lasted ten seconds.

Of course, I shouted, but without effect. I got the wild notion that Schmidt and the ship had become invisible by some agency, and rushed through the place where they had been, meeting nothing but empty air. I recall cursing myself for a witless fool, then assuring myself that the lad must be somewhere in the chamber, and beginning a frantic search through the shadows of the great room, candle in hand.

As I ran my hand futilely along a wall, I heard the voice for the first time.

It was a calm, rather harsh voice, speaking in German, I thought, yet not German either. I must have spun like a top at the sound.

There stood the ship, precisely where it had stood only moments before, but of Schmidt, no sign. Instead, standing upright within the vessel was the dark figure of a man, his face, it seemed, turned toward me in the gloom.

I gasped. I tried to speak, to frame a question, some word about Schmidt, but the sounds that came out of my mouth were mere mumbles of terror. And then the figure stepped over the side of the vessel onto the floor and came toward me while I backed away across the room, repeating his query—such it was, by his tone—in the same harsh, self-assured accents. Amid my fright, my mind sought automatically for the secret of his strangely familiar tongue, which was like, yet unlike, German—then I knew, still backing away.

German it was, incredibly antique German, the speech of centuries ago!

My shoulder blades brought up hard against the wall, and simultaneously the man from the ship stood before me. He was a being of powerful build, dressed in a belted gown of some dark stuff, thick-necked, with a rough, red face. His hair tumbled on his shoulders, and he wore a short, dark beard. Tremblingly, searching for the archaic words. I framed a sentence to him.

"Where . . . is . . . the boy?"

The man—plainly, he was a living man—gestured as though brushing something away. "Have no fear. He is safe."

This time I understood his barbaric German fairly well. In the same firm, rough tones he went on: "He is well. I seek the three who stole the ship." He paused, gazing fixedly at me. "What know *you* of them?" I sensed a sudden menace in the words. But my confidence had returned a little; somehow this thing, or man, knew about Schmidt. I faced up to him.

"I demand to know what has happened to the boy."

He countered me sternly. "What do *you* do in the Chamber of the Guild?"

"I know nothing of any guild. Where is the boy?"

He looked at me again a long instant. "He is in this room."

I started, then gazed eagerly about. "Here, now—?"

Something like a rough chuckle issued from the grim face. "Now now. In the past. Your past."

This made no sense. "What do these words mean," I said. "How can someone be present in the past?"

His dark features scowled. "Those of the Gammadion ask questions. They do not answer them. I am the Second of the Guild. Better you should give me aid in finding those I seek."

I tried another gambit. Whatever else he was, this man was human, with human reactions. "You seek someone, then?"

"I seek the renegade three, and now that we have the ship again, they shall not escape us. The marks on the arc tell true; this be one of their ports of entry."

"I will help you." I was bolder, now. "But first—if I do, will my friend come back?"

He looked down his big nose at me. "The Guild bargains with no man, in any age. Yet—there are things even we know not of. What place is this?"

"Does my friend return?" Instinctively, I knew his promise would be a true promise.

He stared at me. "Aye," he said, finally. "If we find the three. Again, what place is this?"

"Munich."

"Still Munich, even yet! And the year—that of Our Lord one thousand nine hundred and—what?"

I told him, and he pursed his bearded lips, muttering to himself. Suddenly he chuckled again, thrust out a rough, red paw and seized my own right hand. His own hand was warm and powerful.

"Feel, oh man of my future, the hand of a man of your past." Again his harsh chuckle. "More than seven centuries lie betwixt flesh and flesh of us, and we span them with a handclasp." Then, at the look on my face, he laughed like a pleased child who has astonished an elder, but when I said nothing—I could not—he misinterpreted it. He dropped my hand. "You do not believe," he said, harshly.

He was right at that moment. I did not. I had heard of time-machines, or read of them. Who would believe in them? And yet—I thought of Schmidt. Where was Schmidt? In this very chamber, the man who called himself the

Second of the Guild, had said. In this same room, but in another time. I had heard theories—the idea that everything that ever happened is always happening—

I spoke to the man. "I am not so ignorant of the past as you think." I paused, to let the statement sink in. "On this same spot, or near by, in the year forty-nine, the forces of Germanicus Caesar fought a great battle with the Suevi. If you possess this power as you claim"—I caught my breath and went on—"doubtless you could visit that battle, bring a token of it here?"

His eyes and nostrils seemed to dilate. With anger? I could not tell. I went on: "If the boy is here in this room, as you say, then by the same token, the battle with the Suevian hordes is likewise in this room."

He gave me a strange look. "Very well, man of the future," he said. A stride or two, and he stood in the ship again, facing me. Bending, he touched the tiller, moved it on the quadrant. This time, it was quicker; hardly had the same eerie, confined spate of sound swelled up within the vessel, like voices in a room heard by one on the outside, than there was a small puff of air, and I blinked. Man and ship had vanished, utterly.

I waited; the minutes dropped away. Had I asked wisely? Now I was alone again. Suppose the ship did not return? Then my one tie to poor little Schmidt, would be gone. Was that the meaning of the strange look he had given me?

There was another minute gust of air, and man and ship stood there again before my eyes. The dark-robed figure stepped from the vessel and approached me.

"Do you believe now, man of the future?" Suddenly he brought his right hand up, almost in my face, and held before my eyes a short, ugly, two-edged sword, the blade tapering to a squat point. Half its length was redness—wet and shining, and as I looked, a crimson drop fell from the point to the floor.

"The blood of a Suevian warrior." His voice was calm. "They fought bravely, then—and fiercely." He threw the sword from him and it rang against the stones of the floor. It was the short-sword of a Roman legionary, the famed weapon that won half a world for the Caesars. "So. You believe, and now you will aid us. Listen, now. There are things you must know."

One day, perhaps, my hand will write the story of the Guild of the Gammadion. When I do, those who would scoff will believe; they will believe because what is to happen soon will demolish their capacity for doubt; when that happens, no one in the world will be able to consider anything past belief, however strange.

That incredible brotherhood of genius flourished amid the darkness of medieval Germany; some of their minor secrets were filched by an English monk the world calls Roger Bacon: a few of their writings fell, centuries later, into the hands of

one Leonardo da Vinci, who understood them faintly. To the good burghers of Munich, they seemed merely another congregation of pious monks, housed in the very building where I sit, writing. Its name, *Morgenhaus*, had for them that second meaning of the word which is "tomorrow." House of Tomorrow it was in truth. It was likewise a house of tragedy.

Austere and lofty-minded as was its leadership, they of the Gammadion had among them misfits—and worse.

The Golden Age for mankind could have dawned here in Bavaria, seven hundred years ago. He told me how plans were complete for the dispatching of emissaries to every court of Europe. His order had made itself the masters of nature: now, nature's treasure house was to be thrown wide, that man might find a new life. And then, as it seems fated always to be for suffering mankind, something happened —

There were three, he said, novices of the order, their dark desires as yet unsuspected, yet given dangerous scope by even such fragmentary knowledge as they had of the Guildsmen's secrets. There was one, something which sounded, as he told me of it, like a heat or dis-

integration ray. Plotting with a neighboring lord, the three bargained with it, surrendered it to him. To him it was a diabolic means for blasting an enemy's stronghold, burning, maiming, killing. To the three, it was a way to get from him the living bodies they needed, in the persons of certain of his miserable serfs.

Later, too late, the Guildsmen learned how the three had nourished perverse ambitions, dared aspire to unnatural arts and skills, the powers of *koerperveranderen*, men able to alter a living body to the semblance of another.

His face contorted in the recital. "Bitterly we accused ourselves; nature had we studied, and neglected to study man himself. Now it was all too plain; man was unfit to use the fearful powers our gifts would confer. Instead of gifts, they would be as the blackest curse!"

He paused a moment. "So it was decided. It had been a bitter, a timely revelation to us. Man was not ready for us. Our works should be destroyed, our brotherhood disbanded!"

It was then, amid the trouble and soul-searching of these men of science that the three renegades did their crowning evil. They plotted again, this time with a shortsighted few who had disputed the dissolution of the Guild; they escaped from imprisonment, and made their way to the deepest chamber, where lay the order's supreme creation, untouched and untried.

"They knew this much, that the genius of the Ship was in its Tiller. The Ship is that most perfect of things, an equation—expressed in tangible shape and substance as a Ship, the most perfect and symmetrically beautiful object man can fashion. Yet is it not quite perfect—not quite whole. One of its parts, one of the elements needed to make it the bodily expression of that which shows the relation of the moment to all Time, is lacking. That other element—when the Tiller moves, the Rudder turns, and the Ship sails in search of its missing part!"

He pointed to the archway through which I first entered the crypt. "Through that way, there, they came, we pursuing them, and entered the Ship, laid hands upon the Tiller and so escaped from us—escaped into the far reaches of Time itself."

I thought of the concept his rapid words evoked, the three evil souls shuttling in millennium-long leaps along the great stream of Time, misusing that almost-perfect thing, that living mathematical entity that forever sought to find its own "X" and become whole. I thought of them seeking out "ports" here and there. Thus, of course, the markings on the quadrant! Then the deep tones of the Second of the Guild dropped toward a close. "You found the Ship, here in your own time. Therefore the three—*they* are now of your time.

The thought had leaped into being in my mind while he was speaking, a mad surmise, utterly fantastic. Yet what was not fantastic

in this whole business? I put the idea in the form of a query, first.

"You call yourself a Guildsman of the . . . the Gammadion?"

He straightened proudly. "Aye."

I stooped, and while he watched, traced a figure in the dust on the floor, holding the candle close so he could see what I did. I had not finished it, when his powerful fingers dug into my shoulder. His voice was harsh. "*You* know the sacred symbol, emblem of all that is good and pure? How know *you* of it?"

I stood up. "Is that, then, the sign of the Gammadion, and the sign of your order?"

"Aye."

"In this age," I told him, "it is no symbol of goodness; it is a thing accursed. It is the symbol of the men you seek. It is called the Swastika."

Of the first two, the Guildsman was not sure. But when I spoke of the crippled dwarf, his eyes blazed. "The mad one with hair on his lip, the fat one with the medals—of them I would not say 'yes.' The outward semblance they know how to change. Almost certainly they have taken forms of living men of your time. But one thing they could not do—heal or change that which was crippled or monstrous. And one of them, one of the three, was crippled so!"

I am ready to believe that they could assume the form and facial features of other living men. Why should I not believe it, when what I have seen so far surpasses it in wonder? But they cannot change the spirit. And for this I have, too, the word of the Guildsman. On this knowledge of the psychology of our quarry we have laid our plan.

The knowledge that their secret is known, that the Ship may be in danger of discovery, is the thing which will bring any one of them here, to this place, to the chamber itself. It is their perfect, secure avenue of escape, if all else is lost. Danger to it cannot be tolerated.

And if one comes, all will come. They know themselves, and so they know each other. Neither will trust either of the others anywhere near the place alone.

A secret police has its uses. I have written them letters. They are the kind of letters one does not write if he wishes to go on living in the Third Reich. They will turn immediate suspicion on me and on this whole section of Munich. Nor is there any question that any and all suspicious references to this part of Munich will go directly to all of them. Small wonder that this is the cradle of this regime.

I am giving them forty-eight hours. A certain time will elapse while the wheels of the police system turn, but when word reaches the top—then action will be swift.

I am now well content for Schmidt to remain where he is, seven centuries away from what is to come. For the aftermath will be frightful.

Now I am going down into the cellars and for the last time. The

Gestapo has many ways of knowing things. If they come here they will not find me, for I have made my bargain with the Guild, too. When the fall comes, I will be with Schmidt. When it is safe, we can both return.

May 27th or 28th, it matters little which—

When this little candle-end is gone there will be no more light for writing. Nor is there much to write.

Yet I am sure any newspaper in the world would be willing to pay me the most fantastic price I cared to ask for it. Even so I must be brief, for it is not easy to write with the left hand. There is no longer any hand to my right arm, and the right shoulder is shattered. The pain is not too bad; more of a numbness.

Someone said once that the best of plans often go wrong. And often they do not go wrong, precisely. They simply turn out a little differently.

I entered the crypt yesterday, or today—I do not know, now; when he eluded me, I fainted; I do not know how long I lay unconscious.

We were quite certain how they would come, through the heavily blocked archway at the far side of the great chamber. And we were ready for them. That is, *he* was ready for them. He showed me the plain, little device he had fetched out of the past. He showed me how it worked, for just one instant, against a section of the stone wall, and I shuddered.

We talked briefly. I reassured him that we had a good twenty-four hours to get through, yet. I had a little food, and a blanket, and I lay down to sleep a little. I was awakened by a touch. The Guildsman bent over me, hissing something in rapid, barbaric German, something about "sounds on the farther side." Then he was gone, and I was still half-asleep. I suppose he returned to the bricked-up barrier. I will never know, for I never spoke to him again.

The explosion came within seconds of my wakening. I was getting to my feet, and the concussion felled me. As I lay, a heavy body was propelled against mine, and fell across me. The Guildsman lay, a dead weight, across my legs. When I struggled up again, he did not move.

A neat, yard-wide opening was blasted in the heavy wall. I saw that it had been of great thickness. Beyond stretched a brilliantly lit corridor. The air was heavy with the dust of the blast, so that the figure coming through the jagged hole now, black against the strong light behind him, was like something seen in a dream. Yet even in silhouette, I knew him. How many times had I not seen him, in newspapers, in motion pictures, even, in the old days before war came, thrilled like others of the Reich to his living presence among us at the great *parteifesten*.

Now his back was turned. It was quite plain that he had no suspicion of any other presence in the vault with him. I walked quietly

toward him, and as I did, shots rang out. He was shooting; and coming nearer, I saw that others in the corridor were shooting, too. There were the other two—the fat one and the crippled dwarf, and all three were shooting, coolly murdering, one by one, the members of a little bunch of black-uniformed men out in the corridor. They were S.S. men. The last one bent double and fell, a horribly ludicrous expression on his face. I thought: "That is the last murder of a murderous regime." But at the same instant I was wildly wondering what I would do. I did not know. I could think of no single action to take.

As always, it was the simplest factor of all which had been omitted from our plans, the possibility that our quarry would move voluntarily, would act to make their escape from a collapsing world even before our messages could take effect!

Another moment, now, and they would be in the room. They would find me there. Then I remembered the Guildsman's weapon. I knew that it had lain close to where I had slept. In a flash I had found it, and moved carefully back toward the little massacre at the barrier.

I was now between the three coming through the wall, and the Ship. It sat on the stone floor as always, bright and silent—I knew what I would do. My responsibility was to little Schmidt. I had no confidence in my ability to return the three worst villains in human annals to their proper place in time. I felt reasonably certain that I could, alone, project myself to Schmidt and rescue him from life and death among God knows what conditions.

And yet, I had first to deal with these monstrous scoundrels! They were present, in the room. The fat one was now squeezing his immense bulk through the opening. Nonetheless, it was for the back of the Leader that I aimed. I pointed the device in the strange way the Guildsman had done, praying that I did right, and activated it. I aimed for the Leader, but it was the great paunch of the other that was hit. He screamed horribly, clawed at the awful wound as it opened and spread, and slumped among the debris. At his yell, the little dwarf turned furiously, and his small features were a mask of hate. Plainly, he considered that *he* was being fired on. He shot through the opening, but his first hurried bullet struck the fat one; the heavy body jerked at the impact. And then the Leader himself, flattening against the edge of the hole, fired at the dwarf. *His* aim was excellent. The evil little creature, his mouth wide open, pitched forward into the aperture and lay there.

All this happened within seconds, for before I could activate the weapon again, the Leader was facing me, pistol in hand. He saw me almost instantly. And he saw the thing I held.

Even in that semidarkness, the face betrayed his awareness of what it was. Not for the first time was he seeing this. He knew what it

was and what it could do; the fear on the face showed that. For a moment, only; then that familiar, too familiar face opened. From its lips came the voice I, like all other Germans, know as well as my own voice, the voice that, a thousand times over, has told us what was our duty in tones of stern command.

"Would you destroy your Fuehrer?"

It was only for a split second that habit, powerful habit, was in the saddle; but for that fraction of time I was a good citizen of the Reich, hearkening to my Fuehrer's order. Only an instant—but in that instant, his pistol exploded one final time, and my right shoulder exploded, too. I saw him leap past me as I reeled with the blow of the bullet; the Guildsman's great weapon was somewhere in the darkness. Sobbing with rage and fury—I felt no pain—I turned toward the Ship.

In it stood the figure in uniform. Already, he was stooping to the Tiller; the swastika reaching for mastery over the gammadion. There was a smile on his dark face, the face that once had belonged to a little paper hanger named Hitler.

I flung myself at the shining Ship and its triumphant passenger. I knew that that hand, now on the Tiller, *would not take its owner and the Ship back into the age of the Guild.* I must reach that Tiller and change its setting. Even as I reached the vessel, he swung it around the quadrant. Then my hand was on it; my fingers touched his, sought to grasp and tug; a great sound welled out of the flashing hull.

I felt a sensation in my right forearm as of fiery heat and icy cold at once. The Ship was gone, of course, the Ship and he, and with him a part of me. I have inches left of a right forearm. It is very strange; I feel no pain in it. A part of me is traveling with him into Time, into the future.

It is the future; of that I am certain. For him, return to the past was impossible, unthinkable. I wonder—what age will he select for his next calling-place? What man of that time will furnish him with form and feature anew?

A vast explosion had sounded somewhere above me; they reached us, it would seem. That was many hours ago; now for a long time, there have been no more blasts; the bombing of Munich has stopped. Has it stopped for good and all? Do they know already?

It is little Schmidt who is well off; still in his beloved past, among real knights in armor, sceptered kings, narrow streets, gabled roofs.

The candle is nearly gone. I am growing weak, now, slowly. Probably I have lost blood—

The Vorberk glanced up at the sound of the door opening; then an underprober stood before him, breathless. "Vorberk!" He bowed hastily, then rushed on, gasping, "A man—the man—the excavation, today, where the book was found! A marvelous object—"

The Vorberk stood erect. "A shining thing of such a shape—so,

and so?" He demonstrated with his hands. The prober's jaw dropped.

"Why—yes, master. Yes, it is so. How did you . . . but the man—"

"Yes, the man in the shining thing. What of him?"

"He . . . he is dead." The underprober's eyes fell.

"Dead?"

"Two of us were there, only, Vorberk, Helt Swenlac and I. We heard some sound behind us, we turned, and he was there, standing within the shining thing. We started toward him and the thing in his hand, like a ray, spat, and Helt Swenlac fell! I . . . then I was afraid, and I put my ray on him. He is there, what remains of him. I crave forgiveness, Vorberk. Will you come and see?"

In the excavation, the Vorberk stepped to the side of the shining object like a trough or cradle and stared at the remains of the body in it. Then his eyes sought elsewhere, and found that which they were looking for.

He lifted it carefully, a man's hand and part of the forearm, severed with incredible neatness, but recently. The Vorberk could almost feel warmth in the inert flesh. He shook his head, a half-smile on his lips.

Then he placed the thing where it had lain, and turned eagerly to study the shining object. His hand crept out and touched eagerly, gently, a sort of handle projecting inward from one of its extremities.

THE END.

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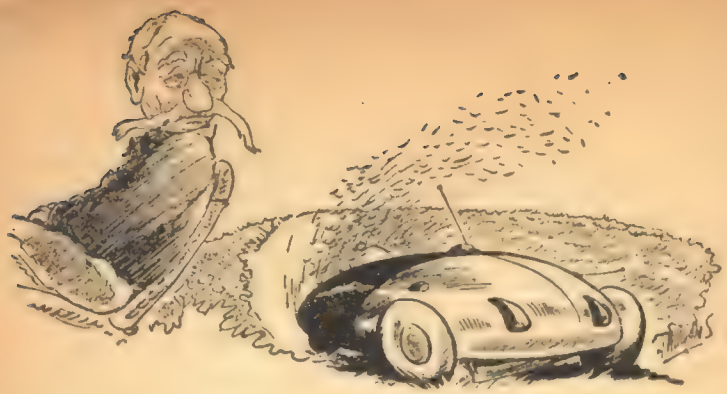


City

by CLIFFORD D. SIMAK

A City is a place where men gather together for mutual protection, and to help each other with the work of living. But there's a point at which the city ceases to serve—

Illustrated by Williams

Gramp Stevens sat in a lawn chair, watching the mower at work, feeling the warm, soft sunshine seep into his bones. The mower reached the edge of the lawn, clucked to itself like a contented hen, made a neat turn and trundled down another swath. The bag holding the clippings bulged.

Suddenly the mower stopped and clicked excitedly. A panel in its side snapped open and a cranelike arm reached out. Grasping steel fingers fished around in the grass, came up triumphantly with a stone clutched tightly, dropped the stone into a small container, disappeared back into the panel again. The lawn mower gurgled, purred on again, following its swath.

Gramp grumbled at it with suspicion.

"Some day," he told himself, "that dadburned thing is going to miss a lick and have a nervous breakdown."

He lay back in the chair and stared up at the sun-washed sky. A helicopter skimmed far overhead. From somewhere inside the house a radio came to life and a torturing clash of music poured out. Gramp, hearing it, shivered and hunkered lower in the chair.

Young Charlie was settling down for a twitch session. Dadburn the kid.

The lawn mower chuckled past and Gramp squinted at it maliciously.

"Automatic," he told the sky. "Ever' blasted thing is automatic now. Getting so you just take a machine off in a corner and whisper in its ear and it scurries off to do the job."

His daughter's voice came to him out the window, pitched to carry above the music.

"Father!"

Gramp stirred uneasily. "Yes, Betty."

"Now, father, you see you move when that lawn mower gets to you. Don't try to out-stubborn it. After all, it's only a machine. Last time you just sat there and made it cut around you. I never saw the beat of you."

He didn't answer, letting his head nod a bit, hoping she would think he was asleep and let him be.

"Father," she shrilled, "did you hear me?"

He saw it was no good. "Sure, I heard you," he told her. "I was just fixing to move."

He rose slowly to his feet, leaning heavily on his cane. Might make her feel sorry for the way she treated him when she saw how old and feeble he was getting. He'd have to be careful, though. If she knew he didn't need the cane at all, she'd be finding jobs for him to do and, on the other hand, if he laid it on too thick, she'd be having that fool doctor in to pester him again.

Grumbling, he moved the chair out into that portion of the lawn that had been cut. The mower, rolling past, chortled at him fiendishly.

"Some day," Gramp told it, "I'm going to take a swipe at you and bust a gear or two."

The mower hooted at him and went serenly down the lawn.

From somewhere down the grassy street came a jangling of metal, a stuttered coughing.

Gramp, ready to sit down, straightened up and listened.

The sound came more clearly, the rumbling backfire of a balky engine, the clatter of loose metallic parts.

"An automobile!" yelped Gramp. "An automobile, by cracky!"

He started to gallop for the gate, suddenly remembered that he was feeble and subsided to a rapid hobble.

"Must be that crazy Ole Johnson," he told himself. "He's the only one left that's got a car. Just too dadburned stubborn to give it up."

It was Ole.

Gramp reached the gate in time to see the rusty, dilapidated old machine come bumping around the corner, rocking and chugging along the unused street. Steam hissed

from the overheated radiator and a cloud of blue smoke issued from the exhaust, which had lost its muffler five years or more ago.

Ole sat stolidly behind the wheel, squinting his eyes, trying to duck the roughest places, although that was hard to do, for weeds and grass had overrun the streets and it was hard to see what might be underneath them.

Gramp waved his cane.

"Hi, Ole," he shouted.

Ole pulled up, setting the emergency brake. The car gasped, shuddered, coughed, died with a horrible sigh.

"What you burning?" asked Gramp.

"Little bit of everything," said Ole. "Kerosene, some old tractor oil I found out in a barrel, some rubbing alcohol."

Gramp regarded the fugitive machine with forthright admiration. "Them was the days," he said. "Had one myself used to be able to get a hundred miles an hour out of."

"Still O. K.," said Ole, "if you only could find the stuff to run them or get the parts to fix them. Up to three, four years ago I used to be able to get enough gasoline, but ain't seen none for a long time now. Quit making it, I guess. No use having gasoline, they tell me, when you have atomic power."

"Sure," said Gramp. "Guess maybe that's right, but you can't smell atomic power. Sweetest thing I know, the smell of burning gasoline. These here helicopters and other gadgets they got took all the romance out of traveling, somehow."

He squinted at the barrels and baskets piled in the back seat.

"Got some vegetables?" he asked.

"Yup," said Ole. "Some sweet corn and early potatoes and a few baskets of tomatoes. Thought maybe I could sell them."

Gramp shook his head. "You won't, Ole. They won't buy them. Folks has got the notion that this new hydroponics stuff is the only garden sass that's fit to eat. Sanitary, they say, and better flavored."

"Wouldn't give a hoot in a tin cup for all they grow in them tanks they got," Ole declared, belligerently. "Don't taste right to me, somehow. Like I tell Martha, food's got to be raised in the soil to have any character."

He reached down to turn over the ignition switch.

"Don't know as it's worth trying to get the stuff to town," he said, "the way they keep the roads. Or the way they don't keep them, rather. Twenty years ago the state highway out there was a strip of good concrete and they kept it patched and plowed it every winter. Did anything, spent any amount of money to keep it open. And now they just forgot about it. The concrete's all broken up and some of it has washed out. Brambles are growing in it. Had to get out and cut away a tree that fell across it one place this morning."

"Ain't it the truth," agreed Gramp.

The car exploded into life, coughing and choking. A cloud of dense

blue smoke rolled out from under it. With a jerk it stirred to life and lumbered down the road.

Gramp clumped back to his chair and found it dripping wet. The automatic mower, having finished its cutting job, had rolled out the hose, was sprinkling the lawn.

Muttering venom, Gramp stalked around the corner of the house and sat down on the bench beside the back porch. He didn't like to sit there, but it was the only place he was safe from the hunk of machinery out in the front.

For one thing, the view from the bench was slightly depressing, fronting as it did on street after street of vacant, deserted houses and weed-grown, unkempt yards.

It had one advantage, however. From the bench he could pretend he was slightly deaf and not hear the twitch music the radio was blaring out.

A voice called from the front yard.

"Bill! Bill, where be you?"

Gramp twisted around.

"Here I am, Mark. Back of the house. Hiding from that dadburned mower."

Mark Bailey limped around the corner of the house, cigarette threatening to set fire to his bushy whiskers.

"Bit early for the game, ain't you?" asked Gramp.

"Can't play no game today," said Mark.

He hobbled over and sat down beside Gramp on the bench.

"We're leaving," he said.

Gramp whirled on him. "You're leaving!"

"Yeah. Moving out into the country. Lucinda finally talked Herb into it. Never gave him no peace, I guess. Said everyone was moving away to one of them nice country estates and she didn't see no reason why we couldn't."

Gramp gulped. "Where to?"

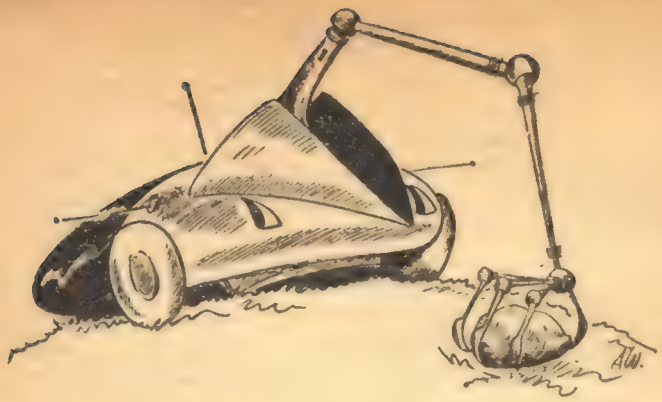
"Don't rightly know," said Mark. "Ain't been there myself. Up north some place. Up on one of the lakes. Got ten acres of land. Lucinda wanted a hundred, but Herb put down his foot and said ten was enough. After all, one city lot was enough for all these years."

"Betty was pestering Johnny, too," said Gramp, "but he's holding out against her. Says he simply can't do it. Says it wouldn't look right, him the secretary of the Chamber of Commerce and all, if he went moving away from the city."

"Folks are crazy," Mark declared. "Plumb crazy."

"That's a fact," Gramp agreed. "Country crazy, that's what they are. Look across there."

He waved his hand at the streets of vacant houses. "Can remember the time when those places were as pretty a bunch of homes as you ever laid your eyes on. Good neighbors, they were. Women ran across from one back door to another to trade recipes. And the men folks would go out to cut the grass and pretty soon the mowers would all be sitting idle and the men would be ganged up, chewin,



the fat. Friendly people, Mark. But look at it now."

Mark stirred uneasily. "Got to be getting back, Bill. Just sneaked over to let you know we were lighting out. Lucinda's got me packing. She'd be sore if she knew I'd run out."

Gramp rose stiffly and held out his hand. "I'll be seeing you again? You be over for one last game?"

Mark shook his head. "Afraid not, Bill."

They shook hands awkwardly, abashed. "Sure will miss them games," said Mark.

"Me, too," said Gramp. "I won't have nobody once you're gone."

"So long, Bill," said Mark.

"So long," said Gramp.

He stood and watched his friend hobble around the house, felt the cold claw of loneliness reach out and touch him with icy fingers. A terrible loneliness. The loneliness of age—of age and the outdated. Fiercely, Gramp admitted it. He was outdated. He belonged to another age. He had outstripped his time, lived beyond his years.

Eyes misty, he fumbled for the cane that lay against the bench, slowly made his way toward the sagging gate that opened onto the deserted street back of the house.

The years had moved too fast. Years that had brought the family plane and helicopter, leaving the auto to rust in some forgotten place, the unused roads to fall into disrepair. Years that had virtually wiped out the tilling of the soil with the rise of hydroponics. Years that had brought cheap land with the disappearance of the farm as an economic unit, had sent city people scurrying out into the country where each man, for less than the price of a city lot, might own broad acres. Years that had revolutionized the construction of homes to a point where families simply walked away from their old homes to the new ones that could be bought, custom-made, for less than half the

price of a prewar structure and could be changed at small cost, to accommodate need of additional space or merely a passing whim.

Gramp sniffed. Houses that could be changed each year, just like one would shift around the furniture. What kind of living was that?

He plodded slowly down the dusty path that was all that remained of what a few years before had been a busy residential street. A street of ghosts, Gramp told himself—of furtive, little ghosts that whispered in the night. Ghosts of playing children, ghosts of upset tricycles and canted coaster wagons. Ghosts of gossiping housewives. Ghosts of shouted greetings. Ghosts of flaming fireplaces and chimneys smoking of a winter night.

Little puffs of dust rose around his feet and whitened the cuffs of his trousers.

There was the old Adams place across the way. Adams had been mighty proud of it, he remembered. Gray field stone front and picture windows. Now the stone was green with creeping moss and the broken windows gaped with ghastly leer. Weeds choked the lawn and blotted out the stoop. An elm tree was pushing its branches against the gable. Gramp could remember the day Adams had planted that elm tree.

For a moment he stood there in the grass-grown street, feet in the dust, both hands clutching the curve of his cane, eyes closed.

Through the fog of years he heard the cry of playing children, the barking of Conrad's yapping pooch from down the street. And there was Adams, stripped to the waist, plying the shovel, scooping out the hole, with the elm tree, roots wrapped in burlap, lying on the lawn.

May, 1946. Forty-four years ago. Just after he and Adams had come home from the war together.

Footsteps padded in the dust and Gramp, startled, opened his eyes.

Before him stood a young man. A man of thirty, perhaps. Maybe a bit less.

"Good morning," said Gramp.

"I hope," said the young man, "that I didn't startle you."

"You saw me standing here," asked Gramp, "like a danged fool, with my eyes shut?"

The young man nodded.

"I was remembering," said Gramp.

"You live around here?"

"Just down the street. The last one in this part of the city."

"Perhaps you can help me then."

"Try me," said Gramp.

The young man stammered. "Well, you see, it's like this. I'm on a sort of . . . well, you might call it a sentimental pilgrimage—"

"I understand," said Gramp. "So am I."

"My name is Adams," said the young man. "My grandfather used to live around here somewhere. I wonder—"

"Right over there," said Gramp.

Together they stood and stared at the house.

"It was a nice place once," Gramp

told him. "Your granddaddy planted that tree, right after he came home from the war. I was with him when we marched into Berlin. That was a day for you—"

"It's a pity," said young Adams. "A pity—"

But Gramp didn't seem to hear him. "Your granddaddy?" he asked. "I seem to have lost track of him."

"He's dead," said young Adams.

"He was messed up with atomic power," said Gramp.

"That's right," said Adams proudly. "He and my Dad got into it early."

John J. Webster was striding up the broad stone steps of the city hall when the walking scarecrow carrying a rifle under his arm caught up with him and stopped him.

"Howdy, Mr. Webster," said the scarecrow.

Webster stared, then recognition crinkled his face.

"It's Levi," he said. "How are things going, Levi?"

Levi Lewis grinned with snagged teeth. "Fair to middling. Gardens are coming along and the young rabbits are getting to be good eating."

"You aren't getting mixed up in any of the hell raising that's being laid to the *houses?*" asked Webster.

"No, sir," declared Levi. "Ain't none of us Squatters mixed up in any wrongdoing. We're law-abiding, God-fearing people, we are. Only reason we're there is we can't make a living no place else. And us living in them places other people up and left ain't harming no one. Police are just blaming us for the thievery and other things that's going on, knowing we can't protect ourselves. They're making us the goats."

"I'm glad to hear that," said Webster. "The chief wants to burn the *houses.*"

"If he tries that," said Levi, "he'll run against something he ain't counting on. They run us off our farms with this tank farming of theirs but they ain't going to run us any farther."

He spat across the steps.

"Wouldn't happen you might have some jingling money on you?" he asked. "I'm fresh out of cartridges and with them rabbits coming up—"

Webster thrust his fingers into a vest pocket, pulled out a half dollar.

Levi grinned. "That's obliging of you, Mr. Webster. I'll bring a mess of squirrels, come fall."

The Squatter touched his hat with two fingers and retreated down the steps, sun glinting on the rifle barrel. Webster turned up the steps again.

The city council session already was in full swing when he walked into the chamber.

Police Chief Jim Maxwell was standing by the table and Mayor Paul Carter was talking.

"Don't you think you may be acting a bit hastily, Jim, in urging such a course of action with the *houses?*"

"No, I don't," declared the chief. "Except for a couple of dozen or

so, none of those houses are occupied by their rightful owners, or rather, their original owners. Every one of them belongs to the city now through tax forfeiture. And they are nothing but an eyesore and a menace. They have no value. Not even salvage value. Wood? We don't use wood any more. Plastics are better. Stone? We use steel instead of stone. Not a single one of those houses have any material of marketable value.

"And in the meantime they are becoming the haunts of petty criminals and undesirable elements. Grown up with vegetation as the residential sections are, they make a perfect hideout for all types of criminals. A man commits a crime and heads straight for the *houses*—once there he's safe, for I could send a thousand men in there and he could elude them all.

"They aren't worth the expense of tearing down. And yet they are, if not a menace, at least a nuisance. We should get rid of them and fire is the cheapest, quickest way. We'd use all precautions."

"What about the legal angle?" asked the mayor.

"I checked into that. A man has a right to destroy his own property in any way he may see fit so long as it endangers no one else's. The same law, I suppose, would apply to a municipality."

Alderman Thomas Griffin sprang to his feet.

"You'd alienate a lot of people," he declared. "You'd be burning down a lot of old homesteads. People still have some sentimental attachments—"

"If they cared for them," snapped the chief, "why didn't they pay the taxes and take care of them? Why did they go running off to the country, just leaving the houses standing. Ask Webster here. He can tell you what success he had trying to interest the people in their ancestral homes."

"You're talking about that Old Home Week farce," yelled Griffin. "Webster spread it on so thick they gagged on it. That's what a Chamber of Commerce mentality always does. People resent having the things they set some store by being used as bait to bring more business into town."

Alderman Forrest King leaped up and pounded on the table, his double chin quaking with rage.

"I'm sick and tired of you taking a crack at the Chamber every chance you get," he yelled. "When you do that you're taking a slap at every business in this city. And the business houses are all this city has left. They're the only ones paying taxes any more."

Griffin grinned sourly. "Mr. King, I can appreciate your position as president of the Chamber."

"You went broke yourself," snarled King. "That's the reason you act the way you do. You lost your shirt at business and now you're sore at business—"

"King, you're crude," said Griffin.

A silence fell upon the room, a cold, embarrassed silence.

Griffin broke it. "I am taking no slap at business. I am protesting the persistence of business in sticking to outmoded ideas and methods. The day of go-getting is over, gentlemen. The day of high pressure is gone forever. Ballyhoo is something that is dead and buried.

"The day when you could have tall-corn days or dollar days or dream up some fake celebration and deck the place up with bunting and pull in big crowds that were ready to spend money is past these many years. Only you fellows don't seem to know it.

"The success of such stunts as that was its appeal to mob psychology and civic loyalty. You can't have civic loyalty with a city dying on its feet. You can't appeal to mob psychology when there is no mob—when every man, or nearly every man has the solitude of forty acres."

"Gentlemen," pleaded the mayor. "Gentlemen, this is distinctly out of order."

King sputtered into life, walloped the table once again.

"No, let's have it out. Webster is over there. Perhaps he can tell us what he thinks."

Webster stirred uncomfortably. "I scarcely believe," he said, "I have anything to say."

"Forget it," snapped Griffin and sat down.

But King still stood, his face crimson, his mouth trembling with anger.

"Webster!" he shouted.

Webster shook his head. "You came here with one of your big ideas," shouted King. "You were going to lay it before the council. Step up, man, and speak your piece."

Webster rose slowly, grim-lipped.

"Perhaps you're too thick-skulled," he told King, "to know why I resent the way you have behaved."

King gasped, then exploded. "Thick-skulled! You would say that to me. We've worked together and I've helped you. You've never called me that before . . . you've—"

"I've never called you that before," said Webster, levelly. "Naturally not. I wanted to keep my job."

"Well, you haven't got a job," roared King. "From this minute on, you haven't got a job."

"Shut up," said Webster.

King stared at him, bewildered, as if someone had slapped him across the face.

"And sit down," said Webster, and his voice bit through the room like a sharp-edged knife.

King's knees caved beneath him and he sat down abruptly. The silence was brittle.

"I have something to say," said Webster. "Something that should have been said long ago. Something all of you should hear. That I should be the one who would tell it to you is the one thing that astounds me. And yet, perhaps, as one who has worked in the interests of this city for almost fifteen years, I am the logical one to speak the truth.

"Alderman Griffin said the city is dying on its feet and his statement

is correct. There is but one fault I would find with it and that is its understatement. The city . . . this city, any city . . . already is dead.

"The city is an anachronism. It has outlived its usefulness. Hydroponics and the helicopter spelled its downfall. In the first instance the city was a tribal place, an area where the tribe banded together for mutual protection. In later years a wall was thrown around it for additional protection. Then the wall finally disappeared but the city lived on because of the conveniences which it offered trade and commerce. It continued into modern times because people were compelled to live close to their jobs and the jobs were in the city.

"But today that is no longer true. With the family plane, one hundred miles today is a shorter distance than five miles back in 1930. Men can fly several hundred miles to work and fly home when the day is done. There is no longer any need for them to live cooped up in a city.

"The automobile started the trend and the family plane finished it. Even in the first part of the century the trend was noticeable—a movement away from the city with its taxes and its stuffiness, a move toward the suburb and close-in acreages. Lack of adequate transportation, lack of finances held many to the city. But now, with tank farming destroying the value of land, a man can buy a huge acreage in the country for less than he could a city lot forty years ago. With planes powered by atomics there is no longer any transportation problem."

He paused and the silence held. The mayor wore a shocked look. King's lips moved, but no words came. Griffin was smiling.

"So what have we?" asked Webster. "I'll tell you what we have. Street after street, block after block, of deserted houses, houses that the people just up and walked away from. Why should they have stayed? What could the city offer them? None of the things that it offered the generations before them, for progress had wiped out the need of the city's benefits. They lost

something, some monetary consideration, of course, when they left the houses. But the fact that they could buy a house twice as good for half as much, the fact that they could live as they wished to live, that they could develop what amounts to family estates after the best tradition set them by the wealthy of a generation ago—all these things outweighed the leaving of their homes.

"And what have we left? A few blocks of business houses. A few acres of industrial plants. A city government geared to take care of a million people without the million people. A budget that has run the taxes so high that eventually even business houses will move to escape those taxes. Tax forfeitures that have left us loaded with worthless property. That's what we have left.

"If you think any Chamber of Commerce, any ballyhoo, any harebrained scheme will give you the answers, you're crazy. There is only one answer and that is simple. The city as a human institution is dead. It may struggle on a few more years, but that is all."

"Mr. Webster—" said the mayor.

But Webster paid him no attention.

"But for what happened today," he said, "I would have stayed on and played doll house with you. I would have gone on pretending that the city was a going concern. Would have gone on kidding myself and you. But there is, gentlemen, such a thing as human dignity."

The icy silence broke down in the rustling of papers, the muffled cough of some embarrassed listener.

John J. Webster turned on his heel and left the room.

Outside on the broad stone steps, he stopped and stared up at the cloudless sky, saw the pigeons wheeling above the turrets and spires of the city hall.

He shook himself mentally, like a dog coming out of a pool.

He had been a fool, of course. Now he'd have to hunt for a job and it might take time to find one. He was getting a bit old to be hunting for a job.

But despite his thoughts, a little tune rose unbidden to his lips. He walked away briskly, lips pursed, whistling soundlessly.

No more hypocrisy. No more lying awake nights wondering what to do—knowing that the city was dead, knowing that what he did was a useless task, feeling like a heel for taking a salary that he knew he wasn't earning. Sensing the strange, nagging frustration of a worker who knows his work is nonproductive.

He strode toward the parking lot, heading for his helicopter.

Now, maybe he told himself, they could move out into the country the way Betty wanted to. Maybe he could spend his evenings tramping land that belonged to him. A place with a stream. Definitely it had to have a stream he could stock with trout.

He made a mental note to go up into the attic and check his fly equipment.

Martha Johnson was waiting at the barnyard gate when the old car chugged down the lane.

Ole got out stiffly, face rimmed with weariness.

"Sell anything?" asked Martha.

Ole shook his head. "It ain't no use. They won't buy farm-raised stuff. Just laughed at me. Showed me ears of corn twice as big as the ones I had, just as sweet and with more even rows. Showed me melons that had almost no rind at all. Better tasting, too, they said."

He kicked at a clod and it exploded into dust.

"There ain't no getting around it," he declared. "Tank farming sure has ruined us."

"Maybe we better fix to sell the farm," suggested Martha.

Ole said nothing.

"You could get a job on a tank farm," she said. "Harry did. Likes it real well."

Ole shook his head.

"Or maybe a gardner," said Martha. "You would make a right smart gardener. Ritzy folks that's moved out to big estates like to have gardeners to take care of flowers and things. More classy than doing it with machines."

Ole shook his head again. "Couldn't stand to mess around with flowers," he declared. "Not after raising corn for more than twenty years."

"Maybe," said Martha, "we could have one of them little planes. And running water in the house. And a bathtub instead of taking a bath in the old washtub by the kitchen fire."

"Couldn't run a plane," objected Ole.

"Sure you could," said Martha. "Simple to run, they are. Why, them Anderson kids ain't no more than knee-high to a cricket and they fly one all over. One of them got fooling around and fell out once, but—"

"I got to think about it," said Ole, desperately. "I got to think."

He swung away, vaulted a fence, headed for the fields. Martha stood beside the car and watched him go. One lone tear rolled down her dusty cheek.

"Mr. Taylor is waiting for you," said the girl.

John J. Webster stammered. "But I haven't been here before. He didn't know I was coming."

"Mr. Taylor," insisted the girl, "is waiting for you."

She nodded her head toward the door. It read:

Bureau of Human Adjustment

"But I came here to get a job," protested Webster. "I didn't come to be adjusted or anything. This is the world committee's placement service, isn't it?"

"That is right," the girl declared. "Won't you see Mr. Taylor?"

"Since you insist," said Webster.

The girl clicked over a switch, spoke into the intercommunicator. "Mr. Webster is here, sir."

"Send him in," said a voice.

Hat in hand, Webster walked through the door.

The man behind the desk had

white hair but a young man's face. He motioned toward a chair.

"You've been trying to find a job," he said.

"Yes," said Webster, "but—"

"Please sit down," said Taylor. "If you're thinking about that sign on the door, forget it. We'll not try to adjust you."

"I couldn't find a job," said Webster. "I've hunted for weeks and no one would have me. So finally, I came here."

"You didn't want to come here?"

"No, frankly, I didn't. A placement service. It has, well . . . it has an implication I do not like."

Taylor smiled. "The terminology may be unfortunate. You're thinking of the employment services of the old days. The places where men went when they were desperate for work. The government operated places that tried to find work for men so they wouldn't become public charges."

"I'm desperate enough," confessed Webster. "But I still have a pride that made it hard to come. But finally, there was nothing else to do. You see, I turned traitor—"

"You mean," said Taylor, "that you told the truth. Even when it cost you your job. The business world, not only here, but all over the world is not ready for that truth. The businessman still clings to the city myth, to the myth of salesmanship. In time to come he will realize he doesn't need the city, that service and honest values will bring him more substantial business than salesmanship ever did."

"I've wondered, Webster, just what made you do what you did?"

"I was sick of it," said Webster. "Sick of watching men blundering along with their eyes tight shut. Sick of seeing an old tradition being kept alive when it should have been laid away. Sick of King's simpering civic enthusiasm when all cause for enthusiasm had vanished."

Taylor nodded. "Webster, do you think you could adjust human beings?"

Webster merely stared.

"I mean it," said Taylor. "The world committee has been doing it for years, quietly, unobtrusively. Even many of the people who have been adjusted don't know they have been adjusted.

"Changes such as have come since the creation of the world committee following the war has meant much human maladjustment. The advent of workable atomic power took jobs away from hundreds of thousands. They had to be trained and guided into new jobs, some with the new atomics, some into other lines of work. The advent of tank farming swept the farmers off their land. They, perhaps, have supplied us with our greatest problem, for other than the special knowledge needed to grow crops and handle animals, they had no skills. Most of them had no wish for acquiring skills. Most of them were bitterly resentful of having been forced from the livelihood which they inherited from their forebears. And being natural individualists, they offered the toughest psychological problems of any other class."

"Many of them," declared Webster, "still are at loose ends. There's a hundred or more of them squatting out in the *houses,* living from hand to mouth. Shooting a few rabbits and a few squirrels, doing some fishing, raising vegetables and picking wild fruit. Engaging in a little petty thievery now and then and doing occasional begging on the uptown streets."

"You know these people?" asked Taylor.

"I know some of them," said Webster. "One of them brings me squirrels and rabbits on occasions. To make up for it, he bums ammunition money."

"They'd resent being adjusted, wouldn't they?"

"Violently," said Webster.

"You know a farmer by the name of Ole Johnson? Still sticking to his farm, still unreconstructed?"

Webster nodded.

"What if you tried to adjust him?"

"He'd run me off the farm," said Webster.

"Men like Ole and the Squatters," said Taylor, "are our special problems now. Most of the rest of the world is fairly well adjusted, fairly well settled into the groove of the present. Some of them are doing a lot of moaning about the past, but that's just for effect. You couldn't drive them back to their old ways of life.

"Years ago, with the advent of atomics, in fact, the world committee faced a hard decision. Should changes that spelled progress in the world be brought about gradually to allow the people to adjust themselves naturally, or should they be developed as quickly as possible, with the committee aiding in the necessary human adjustment? It was decided, rightly or wrongly, that progress should come first, regardless of its effect upon the people. The decision in the main has proven a wise one.

"We knew, of course, that in many instances, this readjustment could not be made too openly. In some cases, as in large groups of workers who had been displaced, it was possible, but in most individual cases, such as our friend Ole, it was not. These people must be helped to find themselves in this new world, but they must not know that they're being helped. To let them know would destroy confidence and dignity, and human dignity is the keystone of any civilization.

"I knew, of course, about the readjustments made within industry itself," said Webster, "but I had not heard of the individual cases."

"We could not advertise it," Taylor said. "It's practically undercover."

"But why are you telling me all this now?"

"Because we'd like you to come in with us. Have a hand at adjusting Ole to start with. Maybe see what could be done about the Squatters next."

"I don't know—" said Webster.

"We'd been waiting for you to come in," said Taylor. "We knew you'd finally have to come here. Any chance you might have had at any kind of job would have been

queered by King. He passed the word along. You're blackballed by every Chamber of Commerce and every civic group in the world today."

"Probably I have no choice," said Webster.

"We don't want you to feel that way about it," Taylor said. 'Take a while to think it over, then come back. Even if you don't want the job we'll find you another one—in spite of King."

Outside the office, Webster found a scarecrow figure waiting him. It was Levi Lewis, snaggle-toothed grin wiped off, rifle under his arm.

"Some of the boys said they seen you go in here," he explained. "So I waited for you."

"What's the trouble," Webster asked. For Levi's face spoke eloquently of trouble.

"It's them police," said Levi. He spat disgustedly.

"The police," said Webster, and his heart sank as he said the words. For he knew what the trouble was.

"Yeah," said Levi. "They're fixing to burn us out."

"So the council finally gave in," said Webster, face grim.

"I just came from police headquarters," declared Levi. "I told them they better go easy. I told them there'd be guts strewed all over the place if they tried it. I got the boys posted all around the place with orders not to shoot till they're sure of hitting."

"You can't do that, Levi," said Webster, sharply.

"I can't!" retorted Levi. "I done it already. They drove us off the farms, forced us to sell because we couldn't make a living. And they aren't driving us no farther. We either stay here or we die here. And the only way they'll burn us out is when there's no one left to stop them."

He shucked up his pants and spat again.

"And we ain't the only ones that feel that way," he declared. "Gramp is out there with us."

"Gramp!"

"Sure, Gramp. The old guy that lives with you. He's sort of taken over as our commanding general. Says he remembers tricks from the war them police have never heard of. He sent some of the boys over to one of them Legion halls to swipe a cannon. Says he knows where we can get some shells for it from the museum. Says we'll get it all set up and then send word that if the police make a move we'll shell the loop."

"Look, Levi, will you do something for me?"

"Sure will, Mr. Webster."

"Will you go in and ask for a Mr. Taylor. Insist on seeing him. Tell him I'm already on the job."

"Sure will, but where are you going?"

"I'm going up to the city hall."

"Sure you don't want me along?"

"No," declared Webster. "I'll do better alone. And, Levi—"

"Yes."

"Tell Gramp to hold up his artillery. Don't shoot unless he has to—but if he has, to lay it on the line."

"The mayor is busy," said Raymond Brown, his secretary.

"That's what you think," said Webster, starting for the door.

"You can't go in there, Webster," yelled Brown.

He leaped from his chair, came charging around the desk, reaching for Webster. Webster swung broadside with his arm, caught Brown across the chest, swept him back against the desk. The desk skidded and Brown waved his arms, lost his balance, thudded to the floor.

Webster jerked open the mayor's door.

The mayor's feet thumped off his desk. "I told Brown—" he said.

Webster nodded. "And Brown told me. What's the matter, Carter. Afraid King might find out I was here? Afraid of being corrupted by some good ideas?"

"What do you want?" snapped Carter.

"I understand the police are going to burn the *houses*."

"That's right," declared the mayor, righteously. "They're a menace to the community."

"What community?"

"Look here, Webster—"

"You know there's no community. Just a few of you lousy politicians who stick around so you can claim residence, so you can be sure of being elected every year and drag down your salaries. It's getting to the point where all you have to do is vote for one another. The people who work in the stores and shops, even those who do the meanest jobs in the factories, don't live inside the city limits. The businessmen quit the city long ago. They do business here, but they aren't residents."

"But this is still a city," declared the mayor.

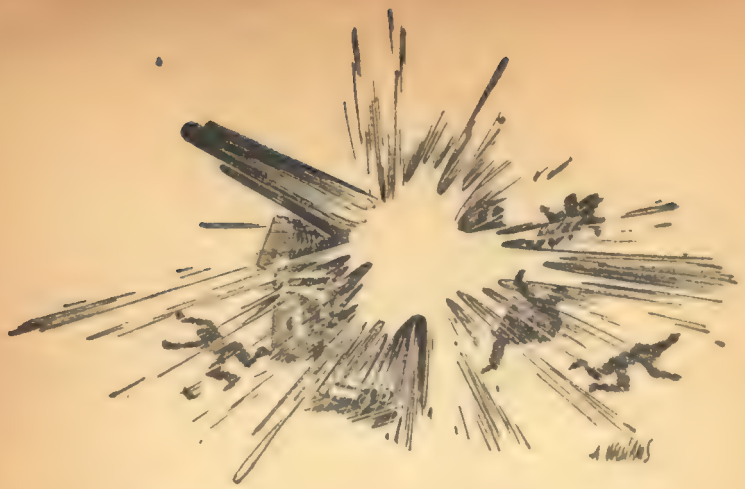
"I didn't come to argue that with you," said Webster. "I came to try to make you see that you're doing wrong by burning those houses. Even if you don't realize it, the *houses* are homes to people who have no other homes. People who have come to this city to seek sanctuary, who have found refuge with us. In a measure, they are our responsibility."

"They're not our responsibility," gritted the mayor. "Whatever happens to them is their own hard luck. We didn't ask them here. We don't want them here. They contribute nothing to the community. You're going to tell me they're misfits. Well, can I help that? You're going to say they can't find jobs. And I'll tell you they could find jobs if they tried to find them. There's work to be done, there's always work to be done. They've been filled up with this new world talk and they figure it's up to someone to find the place that suits them and the job that suits them."

"You sound like a rugged individualist," said Webster.

"You say that like you think it's funny," yapped the mayor.

"I do think it's funny," said Webster. "Funny, and tragic, that anyone should think that way today."



"The world would be a lot better off with some rugged individualism," snapped the mayor. "Look at the men who have gone places—"

"Meaning yourself?" asked Webster.

"You might take me, for example," Carter agreed. "I worked hard. I took advantage of opportunity. I had some foresight. I did—"

"You mean you licked the correct boots and stepped in the proper faces," said Webster. "You're the shining example of the kind of people the world doesn't want today. You positively smell musty, your ideas are so old. You're the last of the politicians, Carter, just as I was the last of the Chamber of Commerce secretaries. Only you don't know it yet. I did. I got out. Even when it cost me something, I got out, because I had to save my self-respect. Your kind of politics is dead. They are dead because any tinhorn with a loud mouth and a brassy front could gain power by appeal to mob psychology. And you haven't got mob psychology any more. You can't have mob psychology when people don't give a care what happens to a thing that's dead already—a political system that broke down under its own weight."

"Get out of here," screamed Carter. "Get out before I have the cops come and throw you out."

"You forget," said Webster, "that I came in to talk about the *houses*."

"It won't do you any good," snarled Carter. "You can stand and talk until doomsday for all the good it does. Those houses burn. That's final."

"How would you like to see the loop a mass of rubble?" asked Webster.

"Your comparison," said Carter, "is grotesque."

"I wasn't talking about comparisons," said Webster.

"You weren't—" The mayor stared at him. "What were you talking about then?"

"Only this," said Webster. "The second the first torch touches the houses, the first shell will land on the city hall. And the second one will hit the First National. They'll go on down the line, the biggest targets first."

Carter gaped. Then a flush of anger crawled from his throat up into his face.

"It won't work, Webster," he snapped. "You can't bluff me. Any cock-and-bull story like that—"

"It's no cock-and-bull story," declared Webster. "Those men have cannons out there. Pieces from in front of Legion halls, from the museums. And they have men who know how to work them. They wouldn't need them, really. It's practically point-blank range. Like shooting the broad side of a barn."

Carter reached for the radio, but Webster stopped him with an upraised hand.

"Better think a minute, Carter, before you go flying off the handle. You're on a spot. Go ahead with your plan and you have a battle on your hands. The *houses* may burn but the loop is wrecked. The business men will have your scalp for that."

Carter's hand retreated from the radio.

From far away came the sharp crack of a rifle.

"Better call them off," warned Webster.

Carter's face twisted with indecision.

Another rifle shot, another and another.

"Pretty soon," said Webster, "it will have gone too far. So far that you can't stop it."

A thudding blast rattled the windows of the room. Carter leaped from his chair.

Webster felt the blood drain from his head, felt suddenly cold and weak. But he fought to keep his face straight and his voice calm.

Carter was staring out the window, like a man of stone.

"I'm afraid," said Webster, "that it's gone too far already."

The radio on the desk chirped insistently, red light flashing.

Carter reached out a trembling hand and snapped it on.

"Carter," a voice was saying. "Carter. Carter."

Webster recognized that voice—the bull-throated tone of Police Chief Jim Maxwell.

"What is it?" asked Carter.

"They had a big gun," said Maxwell. "It exploded when they tried to fire it. Ammunition no good, I guess."

"One gun?" asked Carter. "Only one gun?"

"I don't see any others."

"I heard rifle fire," said Carter.

"Yeah, they did some shooting at us. Wounded a couple of the boys. But they've pulled back now. Deeper into the brush. No shooting now."

"O. K.," said Carter, "go ahead and start the fires."

Webster started forward. "Ask him, ask him—"

But Carter clicked the switch and the radio went dead.

"What was it you wanted to ask?"

"Nothing," said Webster. "Nothing that amounted to anything."

He couldn't tell Carter that Gramp had been the one who knew about firing big guns. Couldn't tell him that when the gun exploded Gramp had been there.

He'd have to get out of here, get over to the gun as quickly as possible.

"It was a good bluff, Webster," Carter was saying. "A good bluff, but it petered out."

The mayor turned to the window that faced toward the *houses*.

"No more firing," he said. "They gave up quick."

"You'll be lucky," snapped Webster, "if six of your policemen come back alive. Those men with the rifles are out in the brush and they can pick the eye out of a squirrel at a hundred yards."

Feet pounded in the corridor outside, two pairs of feet racing toward the door.

The mayor whirled from his window and Webster pivoted around.

"Gramp!" he yelled.

"Hi, Johnny," puffed Gramp, skidding to a stop.

The man behind Gramp was a young man and he was waving something in his hand—a sheaf of papers that rustled as he waved them.

"What do you want?" asked the mayor.

"Plenty," said Gramp.

He stood for a moment, catching back his breath, said between puffs:

"Meet my friend, Henry Adams."

"Adams?" asked the mayor.

"Sure," said Gramp. "His granddaddy used to live here. Out on Twenty-seventh Street."

"Oh," said the mayor and it was as if someone had smacked him with a brick. "Oh, you mean F. J. Adams."

"Bet your boots," said Gramp. "Him and me, we marched into Berlin together. Used to keep me awake nights telling me about his boy back home."

Carter nodded to Henry Adams. "As mayor of the city," he said, trying to regain some of his dignity, "I welcome you to—"

"It's not a particularly fitting welcome," Adams said. "I understand you are burning my property."

"Your property!" The mayor choked and his eyes stared in disbelief at the sheaf of papers Adams waved at him.

"Yeah, his property," shrilled Gramp. "He just bought it. We just come from the treasurer's office. Paid all the back taxes and penalties and all the other things you legal thieves thought up to slap against them houses."

"But, but—" the mayor was grasping for words, gasping for breath. "Not all of it. Perhaps just the old Adams property."

"Lock, stock and barrel," said Gramp, triumphantly.

"And now," said Adams to the

mayor, "if you would kindly tell your men to stop destroying my property."

Carter bent over the desk and fumbled at the radio, his hands suddenly all thumbs.

"Maxwell," he shouted. "Maxwell. Maxwell."

"What do you want?" Maxwell yelled back.

"Stop setting those fires," yelled Carter. "Start putting them out. Call out the fire department. Do anything. But stop those fires."

"Cripes," said Maxwell, "I wish you'd make up your mind."

"You do what I tell you," screamed the mayor. "You put out those fires."

"All right," said Maxwell. "All right. Keep your shirt on. But the boys won't like it. They won't like getting shot at to do something you change your mind about."

Carter straightened from the radio.

"Let me assure you, Mr. Adams," he said, "that this is all a big mistake."

"It is," Adams declared solemnly. "A very great mistake, mayor. The biggest one you ever made."

For a moment the two of them stood there, looking across the room at one another,

"Tomorrow," said Adams, "I shall file a petition with the courts asking dissolution of the city charter. As owner of the greatest portion of the land included in the corporate limits, both from the standpoint of area and valuation, I understand I have a perfect legal right to do that."

The mayor gulped, finally brought out some words.

"Upon what grounds?" he asked.

"Upon the grounds," said Adams, "that there is no further need of it. I do not believe I shall have too hard a time to prove my case."

"But . . . but . . . that means."

"Yeah," said Gramp, "you know what it means. It means you are out right on your ear."

"A park," said Gramp, waving his arm over the wilderness that once had been the residential section of the city. "A park so that people can remember how their old folks lived."

The three of them stood on Tower Hill, with the rusty old water tower looming above them, its sturdy steel legs planted in a sea of waist-high grass.

"Not a park, exactly," explained Henry Adams. "A memorial, rather. A memorial to an era of communal life that will be forgotten in another hundred years. A preservation of a number of peculiar types of construction that arose to suit certain conditions and each man's particular tastes. No slavery to any architectural concepts, but an effort made to achieve better living. In another hundred years men will walk through those houses down there with the same feeling of respect and awe they have when they go into a museum today. It will be to them something out of what amounts to a primeval age, a stepping stone on the way to the better, fuller life. Artists will spend their lives transferring those

old houses to their canvasses. Writers of historical novels will come here for the breath of authenticity."

"But you said you meant to restore all the houses, make the lawns and gardens exactly like they were before," said Webster. "That will take a fortune. And after that, another fortune to keep them in shape."

"I have too much money," said Adams. "Entirely too much money. Remember, my grandfather and father got into atomics on the ground floor."

"Best crap player I ever knew, your grandddaddy was," said Gramp. "Used to take me for a cleaning every pay day."

"In the old days," said Adams, "when a man had too much money, there were other things he could do with it. Organized charities, for example. Or medical research or something like that. But there are no organized charities today. Not enough business to keep them going. And since the world committee has hit its stride, there is ample money for all the research, medical or otherwise, anyone might wish to do.

"I didn't plan this thing when I came back to see my grandfather's old house. Just wanted to see it, that was all. He'd told me so much about it. How he planted the tree in the front lawn. And the rose garden he had out back.

"And then I saw it. And it was a mocking ghost. It was something that had been left behind. Something that had meant a lot to someone and had been left behind. Standing there in front of that house with Gramp that day, it came to me that I could do nothing better than preserve for posterity a cross section of the life their ancesters lived."

A thin blue thread of smoke rose above the trees far below.

Webster pointed to it. "What about them?"

"The Squatters stay," said Adams, "if they want to. There will be plenty of work for them to do. And there'll always be a house or two that they can have to live in.

"There's just one thing that bothers me. I can't be here all the time myself. I'll need someone to manage the project. It'll be a lifelong job."

He looked at Webster.

"Go ahead, Johnny," said Gramp.

Webster shook his head. "Betty's got her heart set on that place out in the country."

"You wouldn't have to stay here," said Adams. "You could fly in every day."

From the foot of the hill came a hail.

"It's Ole," yelled Gramp.

He waved his cane. "Hi, Ole. Come on up."

They watched Ole striding up the hill, waiting for him, silently.

"Wanted to talk to you, Johnny," said Ole. "Got an idea. Waked me out of a sound sleep last night."

"Go ahead," said Webster.

Ole glanced at Adams. "He's all right," said Webster. "He's Henry Adams. Maybe you remember his grandfather, old F. J."

"I remember him," said Ole.

"Nuts about atomic power, he was. How did he make out?"

"He made out rather well," said Adams.

"Glad to hear that," Ole said. "Guess I was wrong. Said he never would amount to nothing. Daydreamed all the time."

"How about that idea?" Webster asked.

"You heard about dude ranches, ain't you?" Ole asked.

Webster nodded.

"Place," said Ole, "where people used to go and pretend they were cowboys. Pleased them because they really didn't know all the hard work there was in ranching and figured it was romanticlike to ride horses and—"

"Look," asked Webster, "you aren't figuring on turning your farm into a dude ranch, are you?"

"Nope," said Ole. "Not a dude ranch. Dude farm, maybe. Folks don't know too much about farms any more, since there ain't hardly no farms. And they'll read about the frost being on the pumpkin and how pretty a—"

Webster stared at Ole. "They'd go for it, Ole," he declared. "They'd kill one another in the rush to spend their vacation on a real, honest-to-God, old-time farm."

Out of a clump of bushes down the hillside burst a shining thing that chattered and gurgled and screeched, blades flashing, a crane-like arm waving.

"What the—" asked Adams.

"It's that dadburned lawn mower!" yelped Gramp.

THE END.

DEATH ON THE NILE

Why should Monk and Ham double-cross Doc? Well, they thought they had a reason, and they were meeting all kinds of characters in Egypt — among them a beautiful girl, a typical football hero, and a guy named Joe.

And all this added up to more trouble than Doc and his aids ever faced before! Don't miss THE PHARAOH'S GHOST in the June issue of

DOC SAVAGE

AT ALL NEWSSTANDS

Brass Tacks

If the pics are made larger, the stories have to be shorter. Which'll you have, since we can't get paper for both?

Dear Campbell:

You've started '44 out with a splendid issue; all your better authors with excellent stories, and a magnificent cover. The rotogravure section was the best yet, the departments interesting, and there are only two kicks that I can make.

The idea of using the full spread of the cover is a good one, especially since there is such little space anyway. However, couldn't you cut down just a little on the size of the type you use for the cover story—that is, on the cover? Timmins is Rogers' equal in all departments—except we've never seen him on interiors. It seems to me Rogers always did himself fine in brush and ink—why not give Timmins a chance?

"Technical Error" takes first honors, "Far Centaurus" second, and "Ogre" third, followed by "Alias the Living," "The Leech," and lastly, "As Never Was." As soon as I read your blurb on the last one, I thought of the identical paradox that the story presents, and I also have a solution. Let Toynbee go into the future just short of where Walter Toynbee first got the knife, take it and leave it somewhere far in the future. Anyway, there are a lot of loopholes to that theory of time travel, if by going into the past you can never return to your own future. Walter Toynbee, by going back through time—into the past—from the future where he landed, would change the future where he got that knife, and therefore, it could not exist, since every time he started back, the knife could not exist.

"Far Centaurus" is now an old theme, basically, what with Hein-

lein's "Universe," and several other stories in competitors. The ending and the writing jack it up quite a bit, though, but what do science experts, or what *would* science experts think of van Vogt's planetary origin theory?

I think I know now why Simak's writings always seem a little rough now—it's the descriptive language. "Hankered down" and such other expressions are all right for such stories as "Hunger Death," but they don't go well with a plainly-told story, related from an impersonal point of view. Even in a story with a personal viewpoint, it would sound still a little rough.

The two kicks, as I think you know, are the bum illustrations and the absence of Brass Tacks. That both will be back next issue, I'm fairly certain, but just the same, I wish you'd take advantage of the smaller size to give us some book-jackets and near-full pages of illustrations like we used to get. I think your artists are capable of expanding more into larger pics, but while you're at it, why not just change your artist staff—except Timmins and the tried-and-true gentlemen—and see what results you'll get that way? I think the majority of the fans liked Wesso, and I know I do, and though you can't get Rogers, Schneeman, or Dold, Orban—but only on humans—Isip, Wesso, and Timmins would make an admirable staff. Any lesser combination would, too.—John L. Gergen, 221 Melbourne S.E., Minneapolis, Minnesota.

Science-fiction can't seem to get ahead of the world these days! The Eclipse Machine people seem to have some real precision methods already.

Dear Sir:

The story by Hal Clement in your January number entitled "Technical Error" has come to my attention.

In this story, among several unusual techniques described, one, involving the wringing of smooth surfaces, was depended upon for fastening together important parts of their machines.

You might be interested to know that this method was used as early as 1939 by the Eclipse Machine Division of Bendix Aviation Corporation, in the construction of a field instrument (not a laboratory set-up, but a real portable unit). Nine joints in this instrument depended on wringing to hold them together and in alignment. This unit was shipped by train, truck etc. and remained in excellent adjustment.

This method of attachment is considered by us to be thoroughly practical and, wherever the expense is justifiable by the object to be attained, commercially applicable.

I wish I had some of that wringing fluid they used! As a fluid for putting on and taking off the parts we use any available liquid, usually grain alcohol, which has a high wetting coefficient with the material to be wrung.—George E. Merritt, Physicist, Eclipse Machine Division of Bendix Aviation Corporation, Elmira, New York.

To plot a course to another planet, you must know the possible performance of the ship involved. George Smith's ships would plot a very different course from that of a straight rocket!

Dear Sir:

Few indeed, excepting the scientists and engineers concerned, and the science-fiction fans, realize that the development of the new rocket plane marks the first major step toward the achievement of interplanetary travel. This probably is the first practical, jet-propelled aircraft capable of carrying a human being, in existence. The full implication of the preceding sentences is obvious.

I enjoyed Dr. Richardson's article, "Space Fix," very much. However, couldn't Dr. Richardson be persuaded to write something a bit more comprehensive in this line? I realize that it is a very complex subject; that whole encyclopedias could probably be written about it. Nevertheless, many readers would probably enjoy playing around with the mathematics of it. Dr. Richardson tells quite clearly how to find position. But what about plotting a course to another moving object, such as a planet, or another ship?

In connection with this: Astounding seems to be becoming a clearing house for all sorts of information concerning space travel. I heartily approve; keep it up.

And now, about the magazine itself. Many of the old authors are in the armed forces. However, we seem to have some very promising finds, of late. I liked George O. Smith's Venus Equilateral stories very much. "Recoil" was a bit "stiff," that is, in the conversation. Otherwise very good; here's an author to keep.

I have before me two magazines. One is Astounding, December 1937. The cover is gaudy. Except for a slightly superior story quality, it could not be distinguished from a dozen similar magazines. The other is Astounding, December, 1943. It is not a pulp, despite the paper it is printed on. Nor is it a slick. It is an entirely new type of magazine. Keep it so. I hope that in the future, aside from its entertainment value, Astounding will become literally "the magazine of the space ways."—Fred J. Melberg, 3828 Burke Avenue, Seattle, Washington.

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The planet was mysteriously unsafe. Colonists landed—and vanished. Investigators landed, prepared to seek out and warn of danger and how to deal with it—and vanished. No man could ever return to report—the environment saw to that.

Environment

by CHESTER S. GEIER

Illustrated by Orban

The sun was rising above the towers and spires of the city to the west. It sent questing fingers of brightness through the maze of streets and avenues, wiping away the last, pale shadows of night. But in the ageless splendor of the dawn, the city dreamed on.

The ship came with the dawn, riding down out of the sky on wings of flame, proclaiming its arrival in a voice of muted thunder. It came out of the west, dropping lower and lower, to cruise finally in great, slow circles. It moved over the city like a vast, silver-gray hunting hawk, searching for prey. There was something of eagerness

in the leashed thunder of its voice.

Still the city dreamed on. Nothing, it seemed, could disturb its dreaming. Nothing could. It was not a sentient dreaming. It was a part of the city itself, something woven into every flowing line and graceful curve. As long as the city endured, the dream would go on.

The voice of the ship had grown plaintive, filled with an aching disappointment. Its circling was aimless, dispirited. It rose high in the sky, hesitated, then glided down and down. It landed on an expanse of green in what had once been a large and beautiful park.

It rested now on the sward, a great, silver-gray ovoid that had a certain harsh, utilitarian beauty. There was a pause of motionlessness; then a circular lock door opened in its side. Jon Gaynor appeared in the lock and jumped to the ground. He gazed across the park to where the nearest towers of the city leaped and soared, and his gray eyes were narrowed in a frown of mystification.

"Deserted!" he whispered. "Deserted— But why?"

Jon Gaynor turned as Wade Harlan emerged from the lock. The two glanced at each other, then, in mutual perplexity, their eyes turned to the dreaming city. After a long moment, Wade Harlan spoke.

"Jon, I was thinking— Perhaps this isn't the right planet. Perhaps . . . perhaps old Mark Gaynor and the Purists never landed here at all—"

Jon Gaynor shook his brown head slowly. He was a tall, lean figure in a tight-fitting, slate-gray overall. "I've considered that possibility, Wade. No—this is the place, all right. Everything checks against the data given in that old Bureau of Expeditions report. Seven planets in the system—this the second planet. And this world fits perfectly the description given in the report—almost a second Earth. Then there's the sun. Its type, density, rate of radiation, spectrum—all the rest—they check, too."

Gaynor shook his head again. "Granted there could exist another system of seven planets, with the second habitable. But it's too much to suppose that the description of that second planet, as well as the description of its sun, would exactly fit the expedition report. And the report mentioned a deserted city. We're standing in the middle of it now. The only thing that doesn't check is that it's still deserted."

Harlan gave a slight shrug. "That may not mean anything, Jon. How can you be certain that Mark Gaynor and the Purists came here at all? The only clue you have is that old Bureau of Expeditions report, describing this city and planet, which you found among the personal effects Mark Gaynor left behind. It may not have meant anything."

"Perhaps— But I'm pretty sure it did. You see, old Mark and the Purists wanted to live far from all others, somewhere where there would be none to laugh at them for their faith in the ancient religious

beliefs. The only habitable planets which answered their purposes were a tremendously remote few. Of them all, this was the only one possessing a city—and a deserted city at that."

"So you think they must have come here because of the benefits offered by the city?"

"That's one reason. The other . . . well, old Mark had a pile of Bureau of Expedition reports dating back for two hundred years. The report relating to this planetary system was marked in red, as being of special interest. It was the only report so marked—

Harlan smiled in friendly derision. "Add that to a misplaced hero-worship for a crackpot ancestor—and the answer is that we've come on a goose chase. Lord, Jon, even with the Hyperspacial Drive to carry us back over the immense distance, it's going to be a terrific job getting back to Earth. You know what a time we had, finding this planet. The Hyperspacial Drive is a wonderful thing—but it has its drawbacks. You go in here, and you come out there—millions of miles away. If you're lucky, you're only within a few million miles or so of your destination. If not—and that's most of the time—you simply try again. And again—"

"That's a small worry," Gaynor replied. "And as for old Mark, he was hardly a crackpot. It took one hundred and twenty years for the world to realize that. His ideas on how people should live and think were fine—but they just didn't fit in with the general scheme of things. On a small group, they could have been applied beautifully. And such a group, living and thinking that way, might have risen to limitless heights of greatness. Hero-worship? No—I never had such feelings for my great-great-uncle, Mark Gaynor. I just had a feverish desire to see how far the Purists had risen—to see if their way of life had given them an advantage over others."

Harlan was sober. "Maybe we'll never learn what happened to them, Jon. The city is deserted. Either the Purists came here and left—or they never came here at all."

Gaynor straightened with purpose. "We'll learn which is the answer. I'm not leaving until we do. We'll—" Gaynor broke off, his eyes jerking toward the sky. High up and far away in the blue, something moved, a vast swarm of objects too tiny for identification. They soared and circled, dipped and swooped like birds. And as the two men from another planet watched, sounds drifted down to them—sweet, crystalline tinklings and chimings, so infinitely faint that they seemed to be sensed rather than heard.

"Life—" Harlan murmured. "There's life here of sorts, Jon."

Gaynor nodded thoughtfully. "And that may mean danger. We're going to examine the city—and I think we'd better be armed."

While Harlan watched the graceful, aimless maneuvers of the aerial creatures, Gaynor went back into the ship. In a moment, he returned

with laden arms. He and Harlan strapped the antigravity flight units to their backs, buckled the positron blasters about their waists. Then they lifted into the air, soared with easy speed toward a cluster of glowing towers.

As they flew, a small cloud of the aerial creatures flashed past. The things seemed to be intelligent, for, as though catching sight of the two men, they suddenly changed course, circling with a clearly evident display of excited curiosity. The crystalline chimings and tinklings which they emitted held an elfin note of astonishment.

If astonishment it actually was, Gaynor and Harlan were equally amazed at close view of the creatures. For they were great, faceted crystals whose interiors flamed with glorious color—exquisite rainbow shades that pulsed and changed with the throb of life. Like a carillon of crystal bells, their chimings and tinklings rang out—so infinitely sweet and clear and plaintive that it was both a pain and a pleasure to hear.

"Crystalline life!" Harlan exclaimed. His voice became thoughtful. "Wonder if it's the only kind of life here."

Gaynor said nothing. He watched the circling crystal creatures with wary eyes, the positron blaster gripped in his hand. But the things gave no evidence of being inimical—or at least no evidence of being immediately so. With a last exquisite burst of chimings, they coalesced into a small cloud and soared away, glittering, flashing, with prismatic splendor in the sunlight.

On the invisible wings of their antigravity flight units, Gaynor and Harlan had approached quite close to the cluster of towers which was their goal. Gliding finally through the space between two, they found themselves within a snug, circular inclosure, about the circumference of which the towers were spaced. The floor of the inclosure was in effect a tiny park, for grass and trees grew here, and there were shaded walks built of the same palely glowing substance as the towers. In the exact center of the place was a fountain, wrought of some lustrous, silvery metal. Only a thin trickle of water came from it now.

Gaynor dipped down, landed gently beside the fountain. He bent, peering, then gestured excitedly to Harlan, who was hovering close.

"Wade—there's a bas-relief around this thing! Figures—"

Harlan touched ground, joined Gaynor in a tense scrutiny of the design. A procession of strange, lithe beings were pictured in bas-relief around the curving base of the fountain. Their forms were essentially humanoid, possessed of two arms, two legs, and large, well-formed head. Except for an exotic, fawnlike quality about the graceful, parading figures, Gaynor and Harlan might have been gazing at a depiction of garlanded, Terrestrial youths and maidens.

"The builders of the city," Gaynor said softly. "They looked a lot

like us. Parallel evolution, maybe. This planet and sun are almost twins of ours. Wade—I wonder what happened to them?"

Harlan shook his shock of red hair slowly, saying nothing. His blue eyes were dark with somber speculation.

Gaynor's voice whispered on. "The city was already deserted when that government expedition discovered it some one hundred and thirty years ago. The city couldn't always have been that way. Once there were people on this planet—beings who thought and moved and dreamed, who built in material things an edifice symbolic of their dreaming. Why did they disappear? What could have been responsible? War, disease—or simply the dying out of a race?"

Harlan shrugged his great shoulders uncomfortably. His voice was gruff. "Maybe the answer is here somewhere. Maybe not. If it isn't, maybe we'll be better off, not knowing. When an entire race disappears for no apparent reason, as the people of this city seem to have done, the answer usually isn't a nice one."

The two men took to one of the paths radiating away from the fountain, followed it to a great, arching entranceway at the base of a tower-building. Slowly they entered—the sunlight dimmed and they moved through a soft gloom. Presently they found themselves in a vast foyer—if such it was. In the middle of the place was a circular dais, with steps leading to a small platform at the top.

They mounted the steps, gained

the platform. Of a sudden, a faint whispering grew, and without any other warning, they began to rise slowly into the air. Harlan released a cry of surprise and shock. Gaynor ripped his positron blaster free, sought desperately to writhe from the influence of the force that had gripped him.

And then Gaynor quieted. His eyes were bright with a realization. "An elevator!" he gasped. "Wade—we stepped into some kind of elevating force."

They ceased struggling and were borne gently up and up. They passed through an opening in the ceiling of the foyer, found themselves within a circular shaft, the top of which was lost in the dimness above. Vertical handrails lined the shaft. It was only after passing two floors that they divined the purpose of these. Then, reaching the third floor, each gripped a handrail, and they stepped from the force.

They found themselves within a vast, well-lighted apartment. The source of illumination was not apparent, seeming to emanate from the very walls. Room opened after spacious room—and each was as utterly barren of furnishings as the last. Barren, that is, except for two things. The first was that the walls were covered with murals or paintings—life-sized, rich with glowing color, and almost photographic in detail. The second was that one wall of each room contained a tiny niche. Gaynor and Harlan investigated a niche in one room they entered. Within it was a solitary object—a large jewel, or at least what seemed to be a jewel.

"This is screwy," Harlan muttered. "It doesn't make sense. How could anyone have lived in a place like this?"

Gaynor's eyes were dark with thought. He answered slowly, "Don't make the mistake of judging things here according to our standard of culture. To the builders of the city, Wade, these rooms might have been thoroughly cozy and comfortable, containing every essential necessary to their daily lives."

"Maybe," Harlan grunted. "But I certainly don't see those essentials."

"This thing—" Gaynor lifted the jewel from its niche. "Maybe this thing holds an answer of some kind." Gaynor balanced the jewel in his palm, gazing down at it frowningly. His thoughts were wondering, speculative. Then the speculation faded—he found himself concentrating on the thing, as though by sheer force of will he could fathom its purpose.

And then it happened—the jewel grew cold in his hand—a faint, rose-colored glow surrounded it like an aura. A musical tinkling sounded. Harlan jumped, a yell bursting full-throated from his lungs. Gaynor spun about, surprised, uncomprehending.

"I . . . I saw things!" Harlan husked. "Objects, Jon— The room was full of them—angular ghosts!"

Gaynor stared at the other without speaking. His features were

lax with a dawning awe.

Harlan said suddenly, "Try it again, Jon. Look at that thing. Maybe—"

Gaynor returned his gaze to the jewel. He forced his mind quiet, concentrated. Again the jewel grew cold, and again the tinkling sounded. Harlan was tense, rigid, his narrowed eyes probing the room. Within the room, outlines wavered mistily—outlines of things which might have been strange furniture, or queer, angular machines.

"Harder, Jon! Harder!" Harlan prompted.

Gaynor was sweating. He could feel the perspiration roll down his temples. His eyes seemed to be popping from their sockets.

Harlan strained with his peering. The outlines grew stronger, darkened—but only for a moment. The next they wavered mistily again, thinned, and were gone.

Gaynor drew a sobbing breath, straightened up. He asked, "Wade—what did you see?"

"I don't know for sure. Things—or the ghosts of things. Here—give me that. I'm going to see what I can do."

Gaynor relinquished the jewel. Holding it in his palm, Harlan gathered his thoughts, poised them, focused them. And, watching, Gaynor saw the ghostly outlines for the first time—misty suggestions of angles and curves, hints of forms whose purpose he could not guess. Alien ghosts of alien objects, summoned by will from some alien limbo.

Abruptly, the outlines faded and were gone. The tinkling of the jewel thinned and died.

Harlan drew a shuddering breath. "Jon—you saw them?"

"Yes. Dimly."

"We . . . we haven't got the strength, Jon. We haven't got the power necessary to materialize the objects—whatever they are."

"Maybe that's the drawback. Or—maybe we've got the strength, but simply can't materialize things—objects—whose size, shape, and purpose we do not know and cannot guess."

"That might be it." Harlan's voice grew sharp. "But, great space, Jon, what possibly could be the idea behind it? Why did they—that other race—construct buildings in which the rooms were left unfurnished, or which could be furnished merely by concentrating on . . . on these jewels? What could have been the reason behind it?"

Gaynor shook his head. "We'll never know that, perhaps. At least, we'll never know if we persist in thinking in terms of our own culture. The builders of this city were humanoid, Wade—but mentally they were alien. Don't forget that. These rooms may not have been living quarters at all. They may have been repositories for valuable things, of which the jewels were the means of materializing. Only those who knew how could materialize them. Thus, perhaps, those things were kept safe."

"That might be it," Harlan muttered. "It makes sense."

"These pictures"—Gaynor ges-

tured at the paintings on the walls —"might contain the answer. If we knew how to read them, they might tell us the purpose of these empty rooms—why the furnishings or machines had to be materialized. I wonder, Wade . . . I wonder if each of these pictures is complete in itself, or if each is part of a greater series. You know—like a book. You read one page, and it doesn't make sense. You read the whole thing—and it does."

"The beginning, Jon," Harlan whispered. "We'd have to start at the beginning."

"Yes—the beginning."

Harlan replaced the jewel in its niche, and on the invisible wings of their antigravity flight units, they glided back to the force shaft. Here they switched off their units, allowed the force to carry them up. But the apartments on the upper floors contained nothing new or illuminating. Like the first they had visited, these were empty, save for the wall paintings and the jewels in their niches. They returned to the shaft again, this time to meet a complication.

"Say—how do we get down?" Harlan puzzled. "This thing has been carrying us up all the time, and there doesn't seem to be another one for descending."

"Why, you simply *will* yourself to go down," Gaynor said. Then he looked blankly surprised.

Harlan nodded gravely. "Of course," he said. "That's the answer. I should have thought of it myself."

They descended. Outside, the sun was bright and warm. Under its light the city dreamed on.

Gaynor and Harlan soared through the warmth. The city was very bright and still. Far away and high in the blue, glittering swarms of the crystal creatures darted. Their tinkling and chiming drifted down to the two men.

Gaynor and Harlan descended several times to investigate tower buildings, but these were very much like the first they had visited. The spacious apartments seemed to echo in their strange emptiness, each one seemingly louder than the last. Twice they took turns, attempted to materialize the unguessable furnishings of the rooms. Each time they failed. And afterward they did not disturb the jewels in their niches. They merely gazed at the flaming wall paintings, and came away.

Again they glided through the air, though slowly and thoughtfully, now. They were silent. Beneath them, the city dreamed. Once a cloud of crystal creatures flashed past, sparkling, chiming, but the two did not seem to notice.

"Jon—?" Harlan's voice was hesitant.

"Yes?"

"I don't know how to put it into words, but—well, don't you feel that you are beginning to *know?*"

"Yes—there's the ghost of something in my mind. Those pictures, Wade—"

"Yes, Jon, the pictures."

Again they were silent. Gaynor broke the silence.

"Wade—all my life I've been reading primers. Someone just gave me a college textbook, and I glanced through several pages. Naturally, I did not understand, but here and there I found words familiar to me. They left a ghost in my mind—"

"You've got to go back to the beginning, Jon. You've got to read all the books which will help you to understand that college textbook."

"Yes, Wade, the beginning—"

They drifted on while the city dreamed beneath them. The sun was a swaddling blanket of brightness. Like memory-sounds, faint chimings and tinklings wafted on the air.

And then Gaynor was grasping Harlan's arm. "Wade—down there. Look!" He pointed tensely.

Harlan stiffened as he saw it. The ship was a tiny thing, almost lost amid the greenery of the park. Almost in unison, the two touched the controls of their antigravity flight units, arrowed down in a swift, gentle arc.

The ship was very big, like no ship they had ever seen before. It was a thing of harsh angles, built of some strange red metal or alloy that gleamed in the sunlight with the hue of blood. A square opening gaped in its side. Slowly, Gaynor and Harlan entered it.

It was as though they entered the gloom of another world. Little of what they saw was familiar to them, and they had to guess the purpose of the rest. There were passageways and corridors, and rooms opened from these. A few they were able to identify, but the rest, filled with queer, angular furniture and sprawling machines, escaped classification. They left the ship—and the sunlight felt good.

Gaynor's voice rustled dryly. "They were humanoid, Wade, the people who build that ship. If nothing else made sense, the things we saw showed that. But the people who made that ship were not of the city. They were spawned on some planet circling another sun."

"They came here," Harlan rasped. "They came—and they left that ship behind—Jon . . . they came . . . and they never left this world—"

"Wade—I'm thinking. There might have been other ships—"

Harlan touched the butt of his positron blaster, and his face was pale. "We've got to look, Jon. That's something we've got to know."

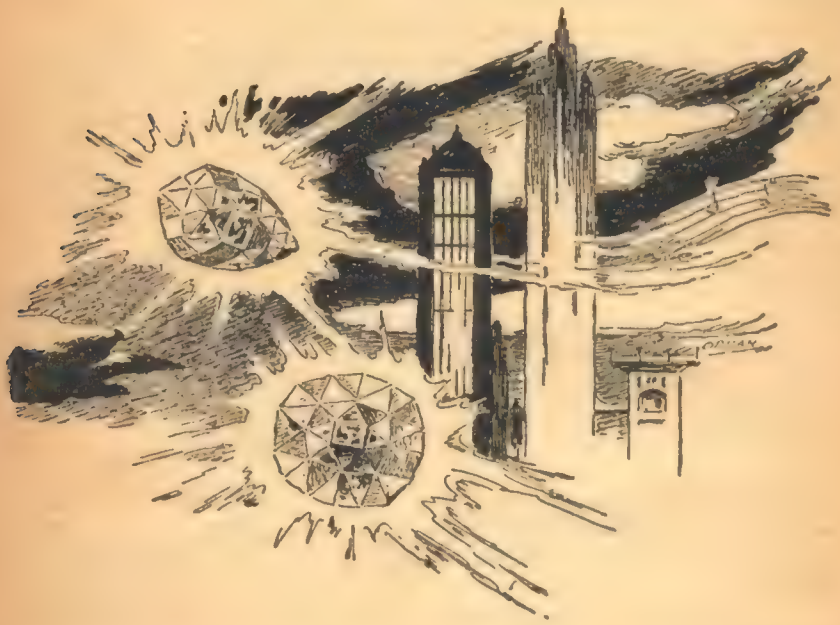
They lifted into the air. Circling and dipping, they searched. The sun was at zenith when they found the second ship. By mid-afternoon they had found a third and a fourth. The fourth was the *Ark*, the hyperspacial cruiser in which old Mark Gaynor and his band of Purists had left the Earth some one hundred and twenty years before.

The four ships which Gaynor and Harlan had found had two things in common. Each had been built by a different humanoid people, and each was completely deserted. Other than this, there was no basis of

comparison between them. Each was separate and distinct, unique in its alienness. Even the *Ark*, long outmoded, seemed strange.

In the *Ark*, Gaynor and Harlan found nothing to indicate what had happened to its passengers. Everything was orderly and neat—more, did they go? What *could* have happened to them?"

Harlan shook his red head somberly. "We'd better not know that. If we stay and try to find out, the same thing will happen to us. That government expedition which discovered this planet en-



even in the most excellent condition. Nothing written had been left behind, not the slightest scrap of rotting paper.

Gaynor whispered, "They *did* come here, then. And the same thing happened to them that happened to all the rest of the people who landed here. The same thing, I'm sure, that happened to the builders of the city. Why did they leave these ships behind? Where

countered the same mystery—but they didn't try to find out. They returned to Earth. Jon—we'd better get back to the *Paragon*. We'd better leave while we can."

"And in time more people would come to settle here. And there would be more empty ships." Gaynor's lips tightened to a stubborn line. "Wade—I'm not leaving until I crack the mystery of this place. I'm going to find what happened to

old Mark and the Purists. We've been warned—we'll be on the alert."

Harlan met Gaynor's determined gaze, and then he looked away. He moistened his lips. After a long moment he gave a stiff nod. His voice was very low.

"Then we've got to start at the beginning, Jon. Those pictures—"

"Yes, Wade, the pictures. I'm sure they hold the answer to the whole thing. We've got to find that beginning. You've noticed how the city is strung out. At one end is the beginning, at the other—"

"The end!" Harlan said abruptly.

"No. Wade. The answer."

They returned first to the *Paragon,* to satisfy pangs of hunger too intense to be ignored any longer. Then, donning their antigravity flight units once more, they took to the air. They circled several times, set out finally for a point on the horizon where the city thinned out and finally terminated.

Their flight ended at a single, slender tower set in the midst of a parklike expanse. That they had reached the end of the city, they knew, for ahead of them no other building was in sight. They floated to the ground, stared silently at the tower. It glowed with a chaste whiteness in the late afternoon light —serene, somewhat aloof, lovely in its simplciity and solitariness.

Harlan spoke softly. "The beginning? Or—the end?"

"That's what we have to find out," Gaynor responded. "We're going in there, Wade."

The interior of the tower was dark and cool, filled with the solemn hush of a cathedral. It consisted solely of one great room, its ceiling lost in sheerness of height. And except for the ever-present wall paintings, it was empty—utterly bare.

Gaynor and Harlan gazed at the paintings, and then they looked at each other, and slowly they nodded. Silently they left.

"That . . . that wasn't the beginning," Harlan stated slowly.

"No, Wade. That was—the end. The beginning lies on the opposite side of the city. But we'll have to postpone our investigation until morning. We wouldn't reach the other end of the city until dark."

They returned to the *Paragon.* The sun was setting behind the towers of the city to the east, sinking into a glory of rose and gold. Slowly the paling fingers of its radiance withdrew from the city. Night came in all its starry splendor.

Gaynor and Harlan were up with the dawn. Eagerness to be back at their investigations fired them. They hurried impatiently through breakfast. Then, attaching kits of emergency ration concentrates to their belts and donning their antigravity flight units, they took to the air.

As they flew, Gaynor and Harlan had to remind themselves that this was the second day of their visit and not the first, so closely did the new day resemble the one preceding. Nothing had changed. The city beneath them still dreamed on. And far away and high in the blue,

glittering clouds of the crystal creatures darted and danced, their chimings and tinklings sounding like echoes of melody from an elfin world.

The sun was bright and warm when Gaynor and Harlan reached the end of the city opposite the one which they had investigated the day before. Here they found no slender tower. There was nothing to show that this part of the city was in any way different from the rest. The general plan of tower-encircled courts was the same as everywhere else. The city merely terminated —or looking at it the other way, merely began.

Gaynor and Harlan glided down into one of the very first of the tower-encircled courts. They touched ground, switched off their flight units, stood gazing slowly about them.

Gaynor muttered, "The beginning? Or— Maybe we were wrong, Wade. Maybe there is no beginning."

"Those towers should tell us," Harlan said. "Let's have a look inside them, Jon."

They entered an arching doorway, strode into a great foyer. Within this they had their first indication that this part of the city actually was different from the rest. For within the foyer was no dais and force shaft as they had found previously. Instead, a broad stairway led to the floors above.

They mounted the stairs. The walls of the first apartment they investigated were covered with paintings, as everywhere else, but this time the spacious rooms were not empty. They were furnished. Gaynor and Harlan gazed upon softly gleaming objects which very clearly were tables and chairs, deep, luxurious couches, and cabinets of various sizes and shapes. At first everything seemed strange to them, and as they glanced about, they found themselves comparing the furniture to that which they had seen in homes on Earth. And after a while things no longer seemed strange at all.

Gaynor blinked his eyes rapidly several times. He frowned puzzledly. "Wade—either I'm crazy, or this room has changed."

Harlan was gazing at the wall paintings. His voice came as from far away. "Changed? Why, yes. Things are as they should be—now."

Gaynor gazed at the walls, and then he nodded. "That's right, Wade. Of course."

Gaynor walked over to a low cabinet. Somewhere before he had seen a cabinet like this one. He felt that he should know its purpose, yet it eluded him. He stared at it musingly. And then he remembered something—his eyes lifted to the paintings on the wall. No. The other wall? Yes.

Gaynor looked at the cabinet again—and now a slow murmur of melody arose within the room. Hauntingly familiar, poignantly sweet, yet formless. Gaynor looked at the walls again. The melody shaped itself, grew stronger, and the lilting strains of a space-

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man's song flooded richly through the room.

I'm blasting the far trails,
Following the star trails,
Taking the home trails,
Back, dear, to you—

"The Star Trails Home to You," Gaynor whispered. Sudden nostalgia washed over him in a wave. Home. The Earth— His eyes lifted to the walls, and he was comforted.

Gaynor looked around for Harlan. He found the other standing before a second cabinet across the room. Gaynor approached him, noting as he did so that Harlan stood strangely rigid and still. In alarm, Gaynor ran the remaining distance. Harlan did not seem to notice. His face was rapt, trance-like.

Gaynor grasped Harlan's arm, shook him. "Wade! Wade—what is it? Snap out of it?"

Harlan stirred. Expression came back into his features—his eyes sharped upon Gaynor's face. "What . . . what— Oh, it's you, Jon. She . . . she had red hair, and . . . and her arms were around me, and—" Harlan broke off, flushing.

Investigation of the cabinets in the other rooms produced still more interesting results. One had a spigot projecting from its front, with a catchbasin below, much like a drinking fountain. Gaynor looked at the wall paintings, and then he looked at the spigot, and suddenly liquid jetted from it. He tasted it cautiously, nodded approvingly, not at all surprised.

"Scotch," he said. "I'll have it with soda."

"Hurry up, then," Harlan prompted impatiently.

There was another cabinet that they found particularly interesting. This one had a foot-square opening in its front, and after Gaynor and Harlan had gotten their proper instructions from the paintings, they moved on—each munching at a delicious leg of roast chicken.

Not all the cabinets produced things which were edible or audible, but all opened up new vistas of thought and experience. Gaynor and Harlan learned the purpose of each, and already in their minds they were devising new methods of test and application. The wall paintings were very expressive, and they were learning rapidly.

That was the beginning—

After the cabinets, which supplied every possible physical or mental want, came the machines. Simple things at first, for Gaynor and Harlan were still in the equivalent of kindergarten. But they were humanoid—and, therefore, inquisitive. The machines were delightful and of absorbing interest. Once their purpose and function became known, however, their novelty died, and Gaynor and Harlan quested on for new fields to conquer. Thus, in a very few days, they moved to the next unit.

Here was the same plan of tower-encircled court, but the cabinets and machines had become more complicated, more difficult of operation. But Gaynor and Harlan had become quite adept at reading the

wall paintings which were their primers. They learned—

Instruction followed application, and in a very few days, again, Gaynor and Harlan moved on. Thus they went, from unit to unit, and always the wall paintings pointed out the way.

The sun rose and the sun set, and the city dreamed on. And always, high in the sky, the crystal creatures circled and soared, tinkling and chiming. The days passed gently, mere wraiths of sunlight.

The machines grew larger, more intricate, ever more difficult of solution. Each was a new test upon the growing knowledge of Gaynor and Harlan. And each test was harder than the last, for the wall paintings no longer pointed out the way, but merely hinted now.

Gaynor and Harlan progressed more slowly, though none the less steadily. They were not impatient. They had no sense of restless striving toward a future goal. They lived for the present. They were submerged heart and soul in the never-ending fascinations of their environment to the exclusion of all else.

The machines continued to grow larger. At one point they were so huge, that a single machine filled an entire apartment. But that was the climax, for afterward the machines grew smaller, ever smaller, until at last they came to a unit the apartments of which were empty. Empty, that is, except for the wall paintings and the jewels in their niches.

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Harlan peered about him, frowning. "I seem to remember this place."

"It *is* familiar," Gaynor said. His brows drew together, and after a time he nodded. "We were here before, I think. But that was many toree ago, when we were children."

"Yes—when we were children. I recall it, now." Harlan smiled reminiscently. "It is strange we knew so little as children that it should be so easily forgotten."

"Yes, we have grown. The memories of childhood are very dim. I can recall some things, but they are not very clear. There was a purpose that brought us to the city. A purpose— But what else could it have been than to learn? And there was a mystery. But there is nothing mysterious about the city, nothing strange at all. Mere imaginings of childhood perhaps—meaningless trifles at best. We will not let them concern us now. We have grown."

Harlan nodded gravely, and his blue eyes, deep with an ocean of new knowledge, lifted to the painting-covered walls. "Events of the past should no longer concern us. We have entered upon the Third Stage. The tasks of this alone should occupy our thoughts."

"Yes—the past has been left behind." Gaynor was looking at the walls. "The Third Stage. The tasks will be very difficult, Wade—but interesting. We'll be putting our knowledge into practice—actually creating. This means we'll have to deal directly with the powers of the various soldani and varoo. As these are extradimensional, control will be solely by cholthening at the sixth level, through means of the taadron. We'll have to be careful, though—any slightest relaxation of the sorran will have a garreling effect—"

"I guessed that. But there must be some way to minimize the garreling effect, if it should occur."

"A field of interwoven argroni of the eighth order should prevent it from becoming overpowering."

"We can try it. You're working on the woratis patterns?"

"Yes. I've managed to cholthen them into the fifth stage of development."

"Mine's the vandari patterns. I've found them more interesting than those of the woratis. Fourth stage of development. I'm starting at once. I'll use the next room."

Harlan left, and Gaynor took the jewel from its niche—the taadron, that is—and set his cholthening power at the sixth level. The thing flamed gloriously in his hand—light pulsed out in great, soft waves, washed over the wall paintings, made them glow with exquisite richness. Unearthly melody filled the room, tuneless, silver-sweet. Gaynor was creating. And as he did so, things began to take on form and substance within the room—things which might have been machines, but weren't machines, because they were intelligent and alive in a way no machine can ever be. Finally, Gaynor and his creations communicated. It was somewhat difficult at first, but

he was well along now, and took the difficulty in his stride.

Gaynor learned things—just as, in the other room, Harlan was learning, too. And then he took up the taadron again and cholthened. The things which he had created vanished. He began to develop the woratis patterns into the fifth stage—

Bright day blended into bright day, gently, unnoticeably. The city floated on the gentle, green swells of the planet, and floating, dreamed.

After a time, Gaynor and Harlan moved on to the next unit. Then the next—and the next. Soon it came to pass that they entered the Fourth Stage. This, they knew, was the last one, but what came afterward did not worry them. They had reached a level of mind which was beyond all worrying.

The Third Stage had changed them greatly, though they were not aware of it. They would not have been concerned even if they had. They no longer used their natural vocal apparatus, now, for they had come to think in terms which simply could not have been put into words. They had become telepathic, conversing in pure ideas of the highest order. And they no longer materialized their food from the atoms of the air. A simple rearrangement of their body cells—simple, when understood as they understood it—now enabled them to feed directly upon certain nourishing extradimensional subatomic energies. And the antigravity flight units, which they had reduced to the size of peas for convenience,

I put the hex on scrubby shaves
With Thin Gillette, the blade that saves!
In record time my face feels swell
And looks right in the pink as well!
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were now discarded entirely. They had learned to fly without the aid of any device.

The Fourth Stage changed them still further. They created now—the word does not quite describe their activities—without the aid of the taadron, for they had learned to ennathen, which was as great an advancement over cholthening as telepathy is over speech. Thus it came about that Gaynor and Harlan—or the beings who once had been Gaynor and Harlan—found their bodies an annoying encumbrance. For arms and legs, heart and lungs, and the senses and nerves which use of these required, had become quite unnecessary to them. They had outgrown these impedimenta of their childhood.

They spoke of this now by a telepathic means that was not quite telepathy, and they wondered what to do. For though they had mastered well the wall paintings which were their college textbooks, there was no clear answer. Their discussion of the problem could not have been made understandable, however roughly it might have been put, but suffice it to say that at last they reached a decision.

They had progressed from one end of the city to the edge of the other. Not quite the edge, though—for there was one building in which they had not yet narleened. They had *examined* it before, of course, but that was when they had been children—in those dim, pale days when they did not understand.

They decided to vogelar to this very last building. Here, perhaps, every question would be answered.

It was dawn when they vogelared through the arching doorway. The first feeble rays of morning crept through the opening—the interior of the Temple was very dark and cool. All the dreaming of the city seemed to be concentrated here in one vast stillness.

The beings who once had been Gaynor and Harlan narleened the paintings on the walls of the Temple, gazed upon them with this new, all-embracing sense which went far beyond the limited realms of mere vision—so that almost the paintings spoke to them and they answered back. They narleened the paintings.

Their every question was answered—for all eternity.

And thus it came about, after a time, that two great, faceted crystals emerged from the doorway of the Temple, and lifted, pulsing with a vibrant new life, flashing in rainbow splendor, into the sky. Higher, they lifted, and higher, chiming and tinkling, soaring to join the others of their kind.

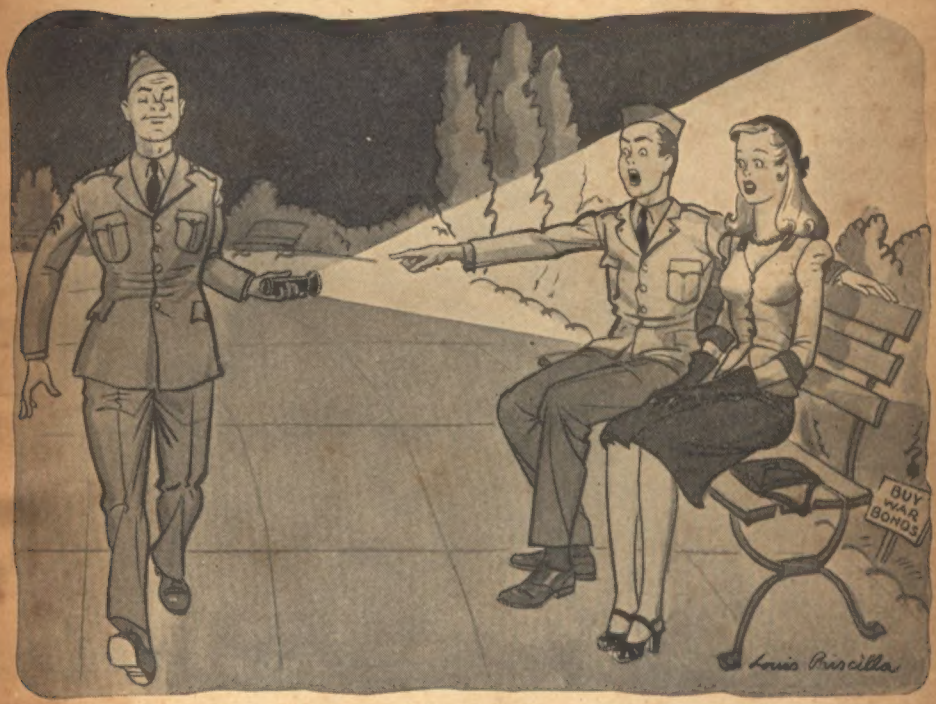
The sun shone brightly in the sky. High and far away in the blue, glittering clouds of crystal creatures darted and danced, sending wave after exquisite wave of crystalline melody upon the gentle shores of air. Among them now were two who had still to learn the intricacies of flight.

And the city dreamed on.

A perfect environment, the city. Ideal for the inquisitive humanoid.

THE END.

LIGHTER MOMENTS with fresh Eveready Batteries



"You're violating the blackout, Sergeant."

A THOUGHT to keep in mind, next time your dealer is out of "Eveready" flashlight batteries: Nearly all we can make right now are being put to good use by either the armed forces or essential war industries.

FRESH BATTERIES LAST LONGER... Look for the date line →

You, personally, can save a soldier's life by giving a pint of blood to the Red Cross. They maintain Blood Donor Centers in 35 cities. Call for an appointment now!

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SALUTE TO A CLEAR-HEADED AMERICAN

The Victory Gardener

Not he alone, nor the family that gathers
at his table—
But all men everywhere, fighting for
Freedom's cause,
Are richer for his work.

For the food he does not buy
is theirs to have . . .
In camps, in ships on every bloody sea,
On battle fronts where food is life itself . . .

And in those dark and hungry lands
now being freed—
Where food is more than life . . .
Where food means
tyranny's long hoped-for end.

The seeds of Victory
are planted in his garden,
And he will harvest them with all his will!
He is a Clear-Headed American.

Published in the interest of the home front war effort . . .

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